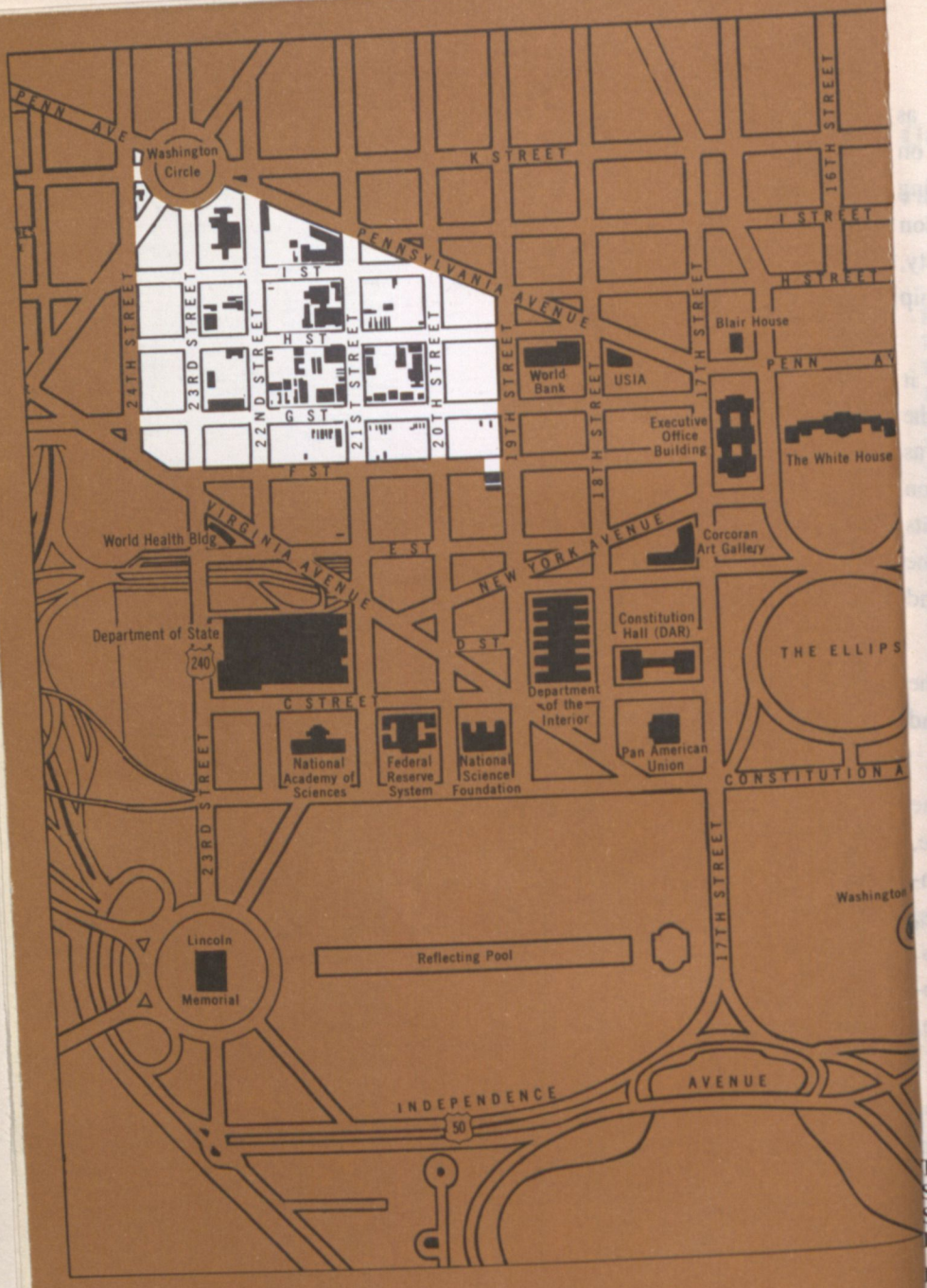
THE GEORGE WASHINGTON UNIVERSITY BULLETIN

UNDERGRADUATE AND GRADUATE CATALOGUE

1973-1974



THE GEORGE WASHINGTON UNIVERSITY CAMPUS/WASHINGTON, D. C.

THE GEORGE WASHINGTON UNIVERSITY BULLETIN

Volume LXXII, Number 8, May, 1973

Published by The University at Washington, D. C. 20006

MONTHLY: JANUARY, MAY, JUNE, JULY
(2 ISSUES IN DECEMBER, FEBRUARY, APRIL)

Second Class Postage Paid at Washington, D. C.

THE GEORGE WASHINGTON UNIVERSITY BULLETIN

UNDERGRADUATE AND GRADUATE CATALOGUE 1973-74

Arts and Sciences, Education, Government and Business Administration, Public and International Affairs

This catalogue lists the programs and faculties of Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Education, the School of Government and Business Administration, and the School of Public and International Affairs.

It also contains information on the Division of University Students, in which students may register for University courses for credit or as auditors without pursuing degree programs.

For information concerning the University's programs and faculties in Engineering and Applied Science, Law, and Medicine, request the appropriate catalogue.

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UNIVERSITIES are undergoing change, either drastically or slowly, as they have been for centuries. Whatever the changes, the one premise on which universities are based remains constant: universities are for learning —for acquiring learning, for transmitting learning, and for the exploration that yields new learning. Any other objective is unworthy of a university and any other purpose is incompatible with the student and his relationship to the institution.

The faculty, through scholarship and research, extends learning, and it transmits learning by teaching. The student learns from the faculty, the library, and the laboratory—if he accepts, as he must accept, learning as his objective. This learning does not take place in a vacuum; in addition to the particular content of learning, the student will develop certain habits of mind—analytical thinking, powers of insight, self-examination, and the use of rational discourse—that will serve him throughout his personal and professional life.

Within this basic context, George Washington University invites the student to take up his residence in order that his energies, interests, and talents may be directed to learning.

Exceptional opportunities for learning are made possible because of the University's location in the heart of the nation's capital. For example cooperative programs are conducted in various fields of study with members of Congress, the Smithsonian Institution, the Library of Congress the National Gallery of Art, and other federal and private organizations In addition to these programs, Washington presents opportunities for observation, study, service, and recreation limited only by the student's time energy, and imagination.

In this atmosphere, George Washington University seeks to provide matrix for learning not available in the standard university education, that no graduate can ever forget that as a student he was at the center things and that he must forever carry additional responsibility in and f society, because of the opportunity that was his.

LLOYD H. ELLIOTT
President
The George Washington Univers

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THE CALENDAR 1973–74*

1973

SEPTEMBER

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1973 FALL SEMESTER

August 31 Orientation for students from foreign countries *Friday*

September 4 Placement tests and advising for entering freshmen who did not attend Summer Advance Registration Sessions *Tuesday*

September 5 Placement tests and advising for transfer students *Wednesday*

September 5 University Faculty Assembly Meeting *Wednesday*

†*September 6–8* Registration *Thursday-Saturday*

Application for February graduation due as part of registration

September 8–9 Activities for new students *Saturday-Sunday*

September 10 Classes begin *Monday*

September 21 Faculty Senate Meeting *Friday*

September 28 Application for October Ed.D. Comprehensive Examinations due *Friday*

* This calendar is subject to change.

† Registration is conducted alphabetically according to the first letter of the student's surname. The alphabetical breakdown and the hours of registration will be stated in the *Schedule of Classes*, which is available well in advance of each semester.

October 5	School of Public and International Affairs Faculty Meeting *Friday*
October 10	Columbian College of Arts and Sciences Faculty Meeting *Wednesday*
October 12	Faculty Senate Meeting *Friday*
October 17	Application for School of Public and International Affairs November Master's Comprehensive Examinations due *Wednesday*
October 18	Board of Trustees Meeting *Thursday*
October 27	Ed.D. Comprehensive Examinations *Saturday*
November 2	Application for December Ed.D., Ed.S., and M.A. in Ed. Comprehensive Examinations due *Friday*
November 9	Faculty Senate Meeting *Friday*
November 10	National Teacher Examinations *Saturday*
November 16–17	School of Public and International Affairs Master's Comprehensive Examinations *Friday-Saturday*
November 21	Thanksgiving recess begins after last class *Wednesday*
November 26	Classes resume *Monday*
November 30–December 1	School of Government and Business Administration Master's Comprehensive Examinations *Friday-Saturday*
December 3	D.B.A., D.P.A., and Ph.D. Dissertations of February candidates due *Monday*
December 6	Last day of fall-semester classes *Thursday*
December 7	School of Public and International Affairs Faculty Meeting *Friday*
December 8	Ed.D., Ed.S., and M.A. in Ed. Comprehensive Examinations *Saturday*
December 12–21	Examination period *Wednesday-Friday*
December 14	Faculty Senate Meeting *Friday*
January 2	Master's Theses of February candidates due *Wednesday*
January 7	Columbian College of Arts and Sciences Faculty Meeting *Monday*
January 7	Ed.D. Dissertations of February candidates due *Monday*

1974 SPRING SEMESTER

January 8–9	Advising for all students *Tuesday-Wednesday*
**January 10–12*	Registration *Thursday-Saturday* Application for May graduation due as part of registration
January 14	Spring-semester classes begin *Monday*
January 17	Board of Trustees Meeting *Thursday*
January 18	Faculty Senate Meeting *Friday*
January 29	University Faculty Assembly Meeting *Tuesday*
February 1	School of Public and International Affairs Faculty Meeting *Friday*

* Registration is conducted alphabetically according to the first letter of the student's surname. The alphabetical breakdown and the hours of registration will be stated in the *Schedule of Classes*, which is available well in advance of each semester.

February 8	Faculty Senate Meeting *Friday*
February 18	Winter Convocation (holiday) *Monday*
March 1	Columbian College of Arts and Sciences Faculty Meeting *Friday*
March 6	Application for School of Public and International Affairs Master's Comprehensive Examinations due *Wednesday*
March 8	Faculty Senate Meeting *Friday*
March 9	Spring recess begins after last class *Saturday*
March 18	Classes resume *Monday*
March 18	Application for April Ed.D., Ed.S., and M.A. in Ed. Comprehensive Examinations due *Monday*
March 21	Board of Trustees Meeting *Thursday*
March 26	D.B.A., D.P.A., and Ph.D. Dissertations of May candidates due *Tuesday*
April 5	School of Public and International Affairs Faculty Meeting *Friday*
April 6	National Teacher Examinations *Saturday*
April 12	Faculty Senate Meeting *Friday*
April 12–13	School of Government and Business Administration and School of Public and International Affairs Master's Comprehensive Examinations *Friday-Saturday*
April 15	Ed.D. Dissertations and Master's Theses (other than those in the School of Public and International Affairs) of May candidates due *Monday*
April 19	Last day of spring-semester classes *Friday*
April 19	Master's Theses of May candidates in the School of Public and International Affairs due *Friday*
April 20	Ed.D., Ed.S., and M.A. in Ed. Comprehensive Examinations *Saturday*
April 25–May 4	Examination period *Thursday-Saturday*
May 1	Columbian College of Arts and Sciences Faculty Meeting *Wednesday*
May 3	Faculty Senate Meeting *Friday*
May 5	Commencement *Sunday*
May 16	Board of Trustees Annual Meeting *Thursday*

FACTS ABOUT GEORGE WASHINGTON UNIVERSITY

General Information	Private, nonsectarian, coeducational, founded 1821
Location	Washington, D.C., bounded by Pennsylvania Avenue and 19th, F, and 24th Streets, N.W.
Number of Students	15,160 (9,749 men, 5,411 women)
Number of Undergraduates	5,481 (3,034 men, 2,447 women)
Geographical Origin of Students	50 states, District of Columbia, 101 countries; 20% are from the Washington area
1973-74 Tuition	Undergraduate: $2,350 for two semester graduate: $86 for each semester hour (se page 28)
Number of Full-time Faculty	810 (78% with Doctoral degrees)
Number of Part-time Faculty	349 (includes some of the most distinguished men in Washington who serve as professorial lecturers)
Residence Hall Space	1,965 (an additional 2,000 students resid in fraternity houses, rooms, and apartments on or near the campus)
Room and Board	Cost varies from $1,415 to $1,575 for th academic year (see page 55)
Campus Organizations	150

Undergraduate majors: Accounting, American Civilization, American Literatur Anthropology, Applied Mathematics, Applied Statistics, Art History, Biology, Botan Business Administration, Cartography, Chemistry, Chinese Language and Literatur Chinese Studies, Civil Engineering, Classical Archaeology and Anthropology, Classic Archaeology and Classics, Classical Humanities, Dramatic Art, Economics, Electric Engineering, Elementary Education, English Literature, Environmental Health, E vironmental Studies, Fine Arts, French Language and Literature, Geodesy, Geograph Geology, Germanic Languages and Literatures, History, International Affairs, Jour alism, Latin, Latin American Studies, Mathematical Statistics, Mathematics, Mecha cal Engineering, Medical Technology, Music (Applied, History and Literatu Theory), Oceanography, Philosophy, Physical Education, Physics, Political Scien Premedicine, Psychology, Public Affairs, Religion, Russian Language and Literatu Russian Literature and Culture—in Translation, Secondary Education, Sociolog Spanish American Literature, Spanish Language and Literature, Speech Communic tion, Speech Pathology and Audiology, Urban Affairs, Zoology.

Study leading to graduate or professional degrees is offered in the Graduate Sch of Arts and Sciences, the National Law Center, the School of Medicine, the Sch of Engineering and Applied Science, the School of Education, the School of Gover ment and Business Administration, and the School of Public and International Affa

THE UNIVERSITY

HISTORY

THE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington, whose name it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the federal city. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company, "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended a "fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "That persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets extending north from Florida Avenue to somewhat beyond Columbia Road. The Medical

School was located downtown. For the better part of the Columbian University period, the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half-century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. The area is not without its reminders of historic interest to the University. President Monroe, who signed the Charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for fifty years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he hoped to see established.

PURPOSE AND OBJECTIVES

The purpose of The George Washington University was to realize "the aspirations of Washington, Jefferson, and Madison, for the erection of a university at the seat of the Federal Government." Over the years it has been the aim to develop the University ideal in the Nation's Capital with a view toward meeting the changing needs of society while continuing to pursue the traditional principles of learning and research.

The George Washington University now rededicates itself and all the resources at its command to the pursuit of knowledge and its dissemination. To this end:

The University recognizes its special opportunities in and obligations to one of the principal capitals of the world. It is a primary objective of the University to utilize its historical, geographical, and functional relationship to the Nation's Capital and the Washington community in continuing the development of a great nationally and internationally oriented university.

The University recognizes the needs of our times and accepts the challenge to develop each student's potential abilities to the fullest extent.

The University is and should remain privately controlled, nonsectarian, and co-educational.

Admission to the University is determined only in terms of the personal character and academic qualifications of the candidates.

A broadly based liberal education is fundamental to the total program of the University.

Expansion of graduate and professional studies and research and the utilization for this purpose of the excellent research facilities and materials available in the Nation's Capital are basic to the continuous development of the University's educational program.

The provision of superior instruction and facilities and the application of high standards of entrance qualifications and academic achievement to all students whether full-time or part-time, on-campus or off-campus, are major missions of the University.

A balanced program of student extracurricular activities is an integral part of the University program.

The University will continue to strive to meet the evident needs of an enlarged student body while governing the size of enrollment by its capacity to supply adequate staff and facilities for the excellent teaching and research which it espouses.

THE COLLEGES, SCHOOLS, AND DIVISIONS

George Washington University includes eleven colleges, schools, and divisions, as follows:

*Columbian College of Arts and Sciences** offers four-year programs in the arts and sciences leading to the degrees of Bachelor of Arts, Bachelor of Science, and (in cooperation with the Department of Pathology and the University Hospital) Bachelor of Science in Medical Technology. The College also provides prelegal and premedical programs, and the preprofessional work required for admission to the School of Education and to the School of Public and International Affairs. Columbian College has academic jurisdiction over the off-campus programs leading to the degrees of Associate in Arts in General Studies, Bachelor of General Studies, Bachelor of Science in Environmental Health, Bachelor of Science in Geodetic and Cartographic Science, and Bachelor of Science in Oceanography. These off-campus programs are administered by the College of General Studies.

The Graduate School of Arts and Sciences† offers advanced study and research leading to the degrees of Master of Arts, Master of Arts in Special Studies, Master of Fine Arts, Master of Music, Master of Science, Master of Science in Forensic Science, Master of Science in Special Studies, Master of Science for Teachers, and Doctor of Philosophy. The degrees of Master of Arts in Special Studies, Master of Science in Forensic Science, and Master of Science in Special Studies are also available through off-campus programs administered by the College of General Studies.

The School of Medicine†† offers work leading to the degree of Doctor of Medicine. The School is also offering programs of study leading to the following undergraduate degrees: Associate in Science (Medical Laboratory Technique), Associate in Science (X-ray Technology), and Bachelor of Science in Allied Health Science (Physician's Assistant). The Associate in Science (Medical Laboratory Technique) degree is offered off campus; the Associate in Science (X-ray Technology) degree is offered both on and off campus. The off-campus programs are administered by the College of General Studies.

The National Law Center offers courses leading to the degrees of Juris Doctor, Master of Laws, Master of Comparative Law, Master of Comparative Law (American Practice), and Doctor of Juridical Science; and special programs in Continuing Legal Education.

The School of Engineering and Applied Science offers courses leading to the degree of Bachelor of Science in the following areas: Civil Engineering, Electrical Engineering, and Mechanical Engineering. Graduate programs lead to the degrees of Master of Science, Master of Engineering Administration, and Doctor of Science. The School has academic jurisdiction over the off-campus programs leading to the degrees of Master of Science, Master of Engineering Administration, and Doctor of Science. These off-campus programs are administered by the College of General Studies.

The School of Education offers undergraduate programs leading to the degrees of Bachelor of Arts in Education and Bachelor of Science in Physical

* Columbian College of Arts and Sciences cooperates with the School of Medicine in offering a program leading to the combined degrees of Bachelor of Arts and Doctor of Medicine.
† The Graduate School of Arts and Sciences cooperates with the School of Medicine in offering a program leading to the combined degrees of Master of Science and Doctor of Medicine and a dual program leading to the degrees of Doctor of Medicine and Doctor of Philosophy.

Education; graduate studies leading to the degrees of Master of Arts in Educa tion, Master of Arts in Teaching, Education Specialist, and Doctor of Edu cation. The degree of Master of Arts in Education is also available throug off-campus programs administered by the College of General Studies.

The School of Government and Business Administration offers undergradu ate programs leading to the degree of Bachelor of Business Administration an graduate programs leading to the degrees of Master of Arts in Government Master of Arts in Health Care Administration, Master of Business Administra tion, Master of Public Administration, Master of Urban and Regional Plan ning; the Post-Master's Graduate Certificate in Health Care Administration the degrees of Doctor of Business Administration and Doctor of Public Ad ministration. The School also has academic jurisdiction over off-campus pro grams leading to the degrees of Bachelor of Science in Administration an Master of Science in Administration. These off-campus programs are ad ministered by the College of General Studies.

The School of Public and International Affairs offers undergraduate pro grams leading to the degree of Bachelor of Arts and graduate programs leadin to the degree of Master of Arts. The School also offers an off-campus progra leading to the degree of Master of Science in International Affairs.

The College of General Studies supplements the adult education program the University through campus and off-campus study; conferences, seminar and special projects; and continuing education and noncredit programs. Th College also administers the off-campus programs over which Columbian Co lege of Arts and Sciences, the Graduate School of Arts and Sciences, the Scho of Engineering and Applied Science, the School of Education, the School Government and Business Administration, and the School of Medicine ha academic jurisdiction.

The Division of University Students makes available courses for students n candidates for degrees in this University.

The Summer Sessions.

ACADEMIC STATUS

George Washington University is accredited by its regional accrediting agenc the Middle States Association of Colleges and Secondary Schools.

The University is on the approved list of the American Association of Un versity Women and is a member of the College Entrance Examination Boar

The National Law Center is a charter member of the Association of Amer can Law Schools and is approved by the Section of Legal Education and A missions to the Bar of the American Bar Association. The School of Medici is a member of the Association of American Medical Colleges and is o of the medical colleges which have been continuously approved by t American Medical Association. Curricula of the School of Engineering a Applied Science in Civil, Electrical, and Mechanical Engineering are accredite by the Engineers's Council for Professional Development. The School of Educ tion is a charter member of the American Association of Colleges for Teach Education and is accredited by the National Council for Accreditation Teacher Education for its Bachelor's and Master's degree programs. The Scho of Government and Business Administration has maintained full membership the Middle Atlantic Association of Colleges of Business Administration sin 1961. It joined the Council on Graduate Education for Public Administrati

in 1966. By invitation, in 1968, the School became a charter academic member of the American Association of Collegiate Schools of Business Assembly. The programs in Public Accounting designed to prepare students for Certified Public Accountants examinations have been approved by the state boards of New York and of Maryland. The program in Hospital Administration is accredited by the National Accrediting Commission on Graduate Education for Hospital Administration. The Department of Chemistry is on the approved list of the American Chemical Society. The graduate program in clinical psychology in the Department of Psychology is on the approved list of the American Psychological Association. The program in speech pathology and audiology is accredited by the Education and Training Board of the American Boards of Examiners in Speech Pathology and Audiology.

LOCATION

The University is in downtown Washington, between Pennsylvania Avenue and 19th, F, and 24th Streets, N.W. In immediately adjacent areas are the White House, the World Bank, the United States Information Agency, the Corcoran Gallery of Art, the Department of State, the Department of the Interior, the General Services Administration, the National Academy of Sciences, and the Kennedy Center for the Performing Arts.

GOVERNMENT

The University is privately endowed and is governed by a self-perpetuating Board of Trustees of which the President of the University is an ex officio member. The members of the Board are named for a period of three years and are divided into three classes. The members of one class are elected at each annual meeting to fill the places of the members whose terms of office expire. Two members of each class are nominated by the Alumni Association.

THE UNIVERSITY LIBRARIES

The Library collections of the University are housed in the University Library, the general library of the University, and in the departmental libraries of law and medicine.

These collections contain over 565,000 volumes—about 395,000 in the University Library, about 121,000 in the Law Library, and about 50,000 in the Medical Library. Approximately 30,000 volumes a year are added to the Library's resources. Endowments supplementing the University appropriation provide books in the fields of American civilization, American literature, foreign service, history, public finance, and the socal sciences; and gifts from many sources have enriched the collections. The Libraries currently receive about 5,500 periodicals.

Information concerning the use of the Libraries may be obtained at the Library service desks.

The Library is administered for the curricular, reference, and recreational needs and interests of the students. Instruction in the use of the library is given upon request by the reference librarians. The Library endeavors to assist students and all members of the University to use the rich library resources of Washington and the unusual opportunities they offer for extensive research.

Interlibrary loan arrangements are maintained with other libraries in the city and throughout the United States.

The student has access to the Library of Congress, the Public Library of the District of Columbia and its branches, the libraries of the Pan American Union, the Bureau of Railway Economics, the U.S. Department of Agriculture, the Smithsonian Institution, the National Library of Medicine, and many of the other great special collections of the government departments. Graduate students at George Washington University may, upon application, be issued a Consortium library card which permits direct borrowing from the libraries of the other Consortium institutions.

THE BOARD OF TRUSTEES OF THE UNIVERSITY

The President of the University is an ex officio member of the Board of Trustees.

E.K. Morris, LL.D., D.P.S., *Chairman Emeritus*

Charles E. Phillips, LL.B., LL.M., *Chairman*
*Everett H. Bellows, M.A., *Vice Chairman*
James M. Mitchell, M.A., *Secretary*
*Thaddeus A. Lindner, B.A. in Govt., *Assistant Secretary*

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Donald C. Cook, B.A., M.B.A., J.D., LL.M., L.H.D., LL.D.
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Charles E. Phillips, LL.B., LL.M.
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Watson W. Wise, Ph.B.

TERM ENDING 1974

*Harold K. Bradford, B.A., LL.B.
Jacob Burns, LL.B., LL.D.
Jacqueline Cochran, L.H.D., LL.D., Sc.D.

* Alumni trustee.

Harry F. Duncan
Katharine Graham, B.A.
L.A. Jennings
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Mark Sullivan, Jr., B.A.
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John J. Wilson, LL.B.
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TERM ENDING 1975

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evelopment; the Vice President for Medical Affairs; the Vice President for dministration; the Vice President for Policy Studies and Special Projects; the ice President for Student Affairs; the Comptroller; the Director of Planning id Budgeting; the Assistant Vice President for Academic Affairs; the Assistt Vice President for Research; the Assistant Vice President and Assistant reasurer; the Registrar; the Director of Admissions; the Director of Public elations; the Dean of Students; the Business Manager; the Director of Perinnel Services; the University Librarian; the Director of the Cloyd Heck Marn Center; the Director of Athletics; and a student representative of Phi Beta appa.

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† Chairman of the Executive Committee.

GENERAL INFORMATION

Admission

E UNIVERSITY ACCEPTS BOTH MEN AND WOMEN. Students are admitted at the ginning of each semester and summer session.

The right is reserved to refuse admission to any student with an academic cord which creates doubt of his ability to succeed in college or who, for any her reason, would not be an acceptable student. In the selection process, there no discrimination because of sex, race, color, or national origin.

An application for admission to degree candidacy should be accompanied by $10 (for undergraduate study) or $25 (for graduate study) application fee.* ie application fee is waived for a student applying for readmission who was gistered as a degree candidate at the time of his last registration at this Uni- rsity and who has not since registered at another institution.

Applicants are urged to submit the application form and complete creden- ils well in advance of the semester for which they seek admission.

All credentials submitted in support of an application are treated confiden- ally and the contents are disclosed only to authorized individuals. Such cre- ntials become the property of the University and cannot be returned.

UNDERGRADUATE ADMISSION†

orms for application for admission or readmission are available at and should returned to the Office of Admissions, George Washington University, Wash- gton, D.C. 20006.

ECONDARY SCHOOL STUDENTS

pplicants who wish to begin college in the fall semester or in either the first or cond term of the summer session *should* apply during the fall term of the

*Application fee must be by check or postal money order, payable to George Washington University.
†For detailed admission requirements, see the appropriate college or school in this Catalogue. Tests quired for admission and Educational Testing Service information are described on pages 69 and 136. e page 26 for admission requirements for students from foreign institutions.

senior year in high school. Preference will be given to students who sub applications and required credentials prior to March 1. Students graduatin mid-year who wish to begin college in the spring semester *should* apply no l than December 1.

Although decisions on most applications for the fall semester will req submission of seventh-term grades and senior-year test scores, an earlier cision will be given after September 1 to a student whose application beco complete with a secondary school record through the junior year and jun year test scores, provided these records clearly establish admissibility.

Early Admission Plan.—Unusually well-prepared students who have c pleted the junior year in high school may be considered for admission if t submit special credentials and have the unqualified recommendation of t principal or counselor. Inquires should specifically mention the Early Admis Plan.

An applicant from a secondary school must arrange to have sent dire from his school to the Office of Admissions a complete academic record gether with a personal evaluation and recommendation from his principal. information may be supplied on a form provided by the University or o standard form used by the secondary school, provided all essential informa is included.

TRANSFER STUDENTS

Undergraduate transfer students from other institutions should submit appl tion and required credentials prior to June 1 for the fall semester, Decem 1 for the spring semester, May 1 for the first summer session, and June 1 the second summer session.

The transfer student must be in good standing as to scholarship and cond He must be eligible to return to the last previously attended institution in semester for which he seeks admission to this University. A student who been academically dismissed or suspended more than one time will not norm be considered for admission.

An applicant who has attended one or more institutions of higher lear must request *each* registrar to mail directly *to the Office of Admissions* a t script of his record, *even though credits were not earned.*

If high school units are not shown on the college transcript or if an appli has fewer than 30 semester hours of acceptable work (*C* or better on acad work from an accredited institution at the time the application is submitted) must request that his high school record and College Entrance Examina Board test scores be sent to the Office of Admissions.

TUITION DEPOSIT

Upon notification of acceptance, a $100 tuition deposit will be required of full-time undergraduate students including those readmitted. The depos credited toward tuition and is not refundable.

ADVANCED STANDING AND ADVANCED PLACEMENT

Assuming there is no duplication of course credit earned, a maximum of semester hours of credit may be assigned for each or any combination of following methods, excepting that earned in service schools:

EDIT BY EXAMINATION

LLEGE ENTRANCE EXAMINATION BOARD ADVANCED PLACEMENT TESTS (APT)

dit is assigned for examinations passed with scores of 4 or 5 on the basis
score report sent to the Office of Admissions from the Educational Testing
vice at the student's request. Examinations passed with scores of 3 will be
sidered for credit or placement if the student arranges to have the examina-
paper sent to the Office of Admissions. The Advanced Placement Tests
administered in the secondary school in May of each year. Normally only
dents who complete a course designated as Advanced Placement are pre-
ed for the examination. Arrangements for the examination are the re-
nsibility of the applicant and should be made with the Program Director,
llege Entrance Examination Board Advanced Placement Examinations, Box
, Princeton, N.J. 08540.

LLEGE ENTRANCE EXAMINATION BOARD COLLEGE-LEVEL EXAMINATION PRO-AM (CLEP)

edit is assigned for the General Examinations passed at the 50th percentile
above (college sophomore norms) with the following restrictions: (1) a
dent must have been out of school for three or more years to be eligible for
dit and (2) no credit will be assigned for the English Composition examina-
n. Credit is assigned for the Subject Examinations passed at the level recom-
nded in the College Board model policy. Arrangements for the examina-
ns are the responsibility of the applicant and should be made with the
llege Entrance Examination Board College-Level Examination Program, Box
21, Princeton, N.J. 08540.

LUMBIAN COLLEGE OF ARTS AND SCIENCES SPECIAL DEPARTMENT EXAMINA-ONS

student may request permission from any of the academic departments to
e an examination prepared by the department in a specific subject. Per-
ssion is not automatically granted; the student must offer evidence that he
s sufficient background to have a reasonable command of the subject-
tter. Awarding of credit for the examinations will be based on the depart-
nt's evaluation of the examination paper.

EDIT EARNED THROUGH UNITED STATES ARMED FORCES INSTITUTE (USAFI)

edit is assigned for approved United States Armed Forces Institute college-
el examinations passed with satisfactory scores.

EDIT FROM HIGHER INSTITUTIONS

lvanced standing may be granted for work successfully completed at accred-
d institutions of higher learning. Credit will be granted for transferred work
ly when it meets the requirements for the degree sought at this University.
may be allowed provisionally. Work of low pass grade (*D* or the equivalent)
ll not be considered for transfer.

CREDIT FROM SERVICE SCHOOLS

A limited amount of credit may be assigned for selected service schoo
struction received since 1941. No more than 30 semester hours may be assi
for a combination of service schools and examinations referred to ab
Veterans should submit to the Office of Admissions photostatic copies of
service school records, indicating courses successfully completed with suffi
identification of the course to locate it in the *Guide to Evaluation of Ed
tional Experience in the Armed Forces.*

ADVANCED PLACEMENT

Advanced placement or waiver of a requirement will be granted on the bas
scores on Achievement Tests of the College Entrance Examination Boar
follows:

Achievement Test	Minimum Score	Exemption
English Composition	650	Waives Engl 1
English Composition	680	Waives Engl 2 or 4
European and/or American History	600	Waives Hist 39-40, 91-9 and/or 71-72
French	650	Waives a two-year lang requirement
German	600	
Hebrew	600	
Latin	600	
Russian	700	
Spanish	650	

GRADUATE ADMISSION*

Graduate School of Arts and Sciences.—Forms for application for admi
or readmission are available at the Office of the Dean of the Graduate S
of Arts and Sciences, George Washington University, Washington, D.C. 2
Completed applications and requests for fellowship support must be subr
by February 15 for admission in the fall semester and by November 1 fo
spring semester. Applications for graduate study are acceptable after
dates for admission in the corresponding semester and will be reviewed if
permits and if space is available in the program desired.

School of Education.—Forms for application for admission or readmi
are available at the Office of the Dean of the School of Education, G
Washington University, Washington, D.C. 20006. When completed, thes
plication forms should be submitted to this Office no later than June 1 fo
fall semester, November 1 for the spring semester, April 1 for the summe
sions.

School of Government and Business Administration.—Forms for applic
for admission or readmission are available at the office of the Admissions
cer, School of Government and Business Administration, George Washi
University, Washington, D.C. 20006. When completed, application

* For detailed admission requirements, see the appropriate college or school in this Catalogu
page 26 for admission requirements for students from foreign institutions.

Master's degree programs should be submitted to this Office no later than y 1 for the fall semester, November 1 for the spring semester, May 1 for the t summer session, and June 1 for the second summer session; those for doc- al programs should be submitted by June 1 for the fall semester, October or the spring semester, and April 1 for both summer sessions.

School of Public and International Affairs.—Forms for application for ad- ssion or readmission are available at the Graduate Admissions Office, School Public and International Affairs, George Washington University, Washing- n, D.C. 20006. When completed, these application forms should be submit- l to this Office no later than March 1 (February 1 for applicants for graduate sistantships and foreign applicants). Admission is for the fall semester only. l credentials, including transcripts from all institutions attended, Graduate ecord Examination scores, and letters of reference, must be received before e deadline date.

DIVISION OF UNIVERSITY STUDENTS ADMISSION*

orms for application for admission to *nondegree* status in the Division of niversity Students are available at and should be returned to the Office of dmissions, George Washington University, Washington, D.C. 20006. When mpleted, these application forms, with credentials when required, should be ceived by the Office of Admissions no later than the Friday before the first ay of registration (see Calendar, pages 5-8). No application fee is charged process an application for admission to this Division. For detailed entrance equirements, see page 179-80.

Registration in a given course may be denied students in this Division when pace is needed for degree candidates.

READMISSION

student previously registered in the University who was not registered on ampus during the immediately preceding semester (summer session excluded), nust apply for readmission. Final dates for applying are the same as those for "Undergraduate Admission" (see pages 21-24), or "Graduate Admission" (see pages 24-25). If the student applies as a degree candidate and was previously egistered as a nondegree student, or if he has attended one or more higher nstitutions during his absence from the University, he must have complete fficial transcripts sent to the appropriate office at this University from each nstitution attended. Applications for readmission are considered on the basis f regulations currently effective.

The application fee is waived for a student applying for readmission who vas registered as a degree candidate at the time of his last registration at this University and who has not since registered at another institution.

* See page 26 for admissions requirements for students from foreign institutions.

STUDENTS FROM FOREIGN INSTITUTIONS*

Application, required records, and scores on the *Test of English as a For Language* (see below) must be received from *foreign applicants* no later t March 1 (February 1 for applicants for graduate study in the School of Pu and International Affairs) for the fall semester and November 1 for the sp semester.

REQUIRED RECORDS

Applicants must request all educational institutions attended to send *directl* the appropriate office (see "Undergraduate Admission," pages 21-24, or "G uate Admission," pages 24-25) official credentials listing subjects studied, gr received, examinations taken, and degrees received. Certified copies of plomas and certificates from secondary schools and all colleges and univers attended are required. Records of state examinations and certificates are needed. All records become the property of the University and *cannot* be turned.

LANGUAGE TEST

Students whose native tongue is not English are required to take the *Tes English as a Foreign Language*. Students are responsible for making arra ments for taking the test and should address inquiries to: TOEFL, Educati Testing Service, Princeton, New Jersey 08540, U.S.A. The completed appl tion form should be returned to the Testing Service at Princeton well in vance of the beginning of the semester for which the applicant seeks admiss The test fee, which should be remitted with the application, entitles the stu to have his test score sent to three different institutions. Registration for *Test of English as a Foreign Language* does *not* constitute application for mission to George Washington University.

The Bulletin of Information, obtainable without charge, contains a des tion of the test as well as rules regarding application, fees, reports, and conduct of the test; lists of examination centers; examination dates; and application blank. On the application for the test, the student should sp that the scores be sent to the appropriate office at this University (see "Un graduate Admission," pages 21-24, or "Graduate Admission," pages 24-

If additional tests are prescribed, necessary instructions will be sent to applicant.

TRANSFER WITHIN THE UNIVERSITY

For information concerning transfer from one college, school, or divisio another within the University, see page 46.

* For detailed admission requirements, see the appropriate college or school in this Catalogue. required for admission and Educational Testing Service information are described on pages 69, and 179.

Registration

DATES, HOURS, AND PLACE OF REGISTRATION will be stated in the *Schedule lasses,* which is available well in advance of each semester.
student cannot register for classes until he has received a letter of admis- to the University issued by the appropriate admitting office.
o registration is accepted for less than a semester or one summer session.
student may not register concurrently in this University and another insti- n without the prior permission of the dean of the college, school, or divi- in which he is registered in this University. Registration in more than one ege, school, or division of the University requires the written permission of deans concerned, *prior to registration.* Allowance of credit for work done currently at another institution is at the discretion of the appropriate com- ee.

GIBILITY FOR REGISTRATION

istration for the following categories of campus students is held on the days registration stated in the University Calendar. A student who is suspended whose record is not clear for any reason is not eligible to register. Registra- in a given course may be denied students in the Division of University dents when space is needed for degree candidates.
New Student.—Upon receipt of a letter of admission, the new student is ible for registration on the stated days of registration.
Readmitted Student.—A student previously registered in the University who s not registered for campus courses during the preceding semester or sum- r session must apply for and receive a letter of readmission from the appro- ate admitting office before he is eligible for registration. A student registered the spring semester of 1973 need not apply for readmission for the fall nester of 1973. Such a student is a "Continuing Student."
Continuing Student.—The student registered for campus courses in the im- diately preceding semester of the academic year is eligible to register upon sentation of his student identification card from the previous semester. The dent registered for the 1973 Summer Sessions campus courses, and not re- icted to summer registration, is eligible to register for the 1973 fall se- ster on presentation of his 1973 Summer Sessions student identification card.

GISTRATION CHANGES AND WITHDRAWALS (See pages 32-33, 45-46)

GISTRATION FOR CONSORTIUM COURSES

udents interested in taking courses at any of the other institutions in the nsortium of Universities of the Washington Metropolitan Area, Inc. (see ge 51), should consult the program announcements of the other institu- ns. Consortium application forms and instructions are available from the gistrar after the student has obtained his registration packet. In order to rticipate in the Consortium program (1) the graduate student must obtain e approval of his adviser and should ascertain from the department of the stitution where the course is taught whether or not he is eligible for the urse and whether there is a space in the class *or* (2) the undergraduate stu-

dent must obtain the approval of his adviser and *must* ascertain from the partment of the institution where the course is taught whether or not h eligible for the course and whether there is space in the class. Specific quiries should be addressed to the Registrar.

Fees and Financial Regulations

FEES PAID BY STUDENTS cover only a portion of the cost of the operation the University. Income from endowment funds, grants, and gifts from alu and friends of the institution make up the difference.

The following fees and financial regulations were adopted for the summer sessions and the academic year 1973-74. (See pages 30-31 for jected tuition and fee increases for 1974-77.)

Tuition Fees

For undergraduate study in Columbian College of Arts and Sciences, the Scho Education, the School of Government and Business Administration, the Schoo Public and International Affairs; for study in the Division of University Stud and for courses taken on campus by undergraduate students in the College of eral Studies:

Full-time program (12 to 18 hours), each semester	$1,17
Part-time program or hours in excess of 18, for each semester hour	

For graduate study* in the Graduate School of Arts and Sciences, the School of Education, the School of Government and Business Administration, and the School of Public and International Affairs; and for courses taken on campus by graduate students in the College of General Studies (Exception: doctoral students registered prior to July 1, 1967, who wish to continue payments according to the plan (see below) in effect prior to that date):

For each semester hour for which a student registers	

For students registered for doctoral degrees† in the Graduate Council (now the Graduate School of Arts and Sciences) and the School of Government and Business Administration prior to July 1, 1967, who wish to continue payments according to the plan in effect prior to that date:

For work leading to and including the general examination	2,35
For work leading to and including the final examination	2,35

For students registered for the Doctor of Education degree‡ prior to July

* Payment of tuition for a Master's thesis entitles the candidate, during the period of registr to the advice and direction of the member of the faculty under whom the thesis is to be w In case a thesis is unfinished, additional time may be granted in accordance with the regulatio the school in which the student is registered.

† The tuition fee is to be paid at the rate of $587.50 a semester or in full at the beginning of stage of the doctoral discipline. No "continuous registration" fee will be charged if a third is needed for completion of either part of the degree requirements. If still more time is nec the student must maintain continuous registration and pay the continuous registration fee.

‡ As long as there is an unpaid balance for the part of the program on which the studen working, he must make at least the minimum tuition payment of $294.00 at each fall and s registration (and for any summer session in which he registers for academic work).

If the total fee is paid for the part of the program on which the student is working, he continue to register, without additional fee, for courses approved by his Master in Research, the expiration of the time allowed for that part of his program.

67, who wish to continue payments according to the plan in effect to that date:

r work leading to and including the major field examination $2,940.00
r work leading to and including the final examination 1,760.00

ersity Center Fee (charged all students registered on campus,* nonrefundable)

students registered for 11 or more semester hours on campus:
ch semester 37.50

students registered for less than 11 semester hours in a semester on ous:
r each semester hour for which the student registers 3.50

students maintaining "continuous registration" status:
ch semester 3.50

itional Course Fees

ertain courses additional fees, such as laboratory and material fees, are charged ndicated in the course descriptions. These fees are charged by the semester and, ss otherwise indicated, may be defrayed in two payments when the tuition is paid his manner. Breakage of apparatus is charged against the individual student. en breakage is in excess of the normal amount provided for in the laboratory fee, individual student will be required to pay such additional charges as are deter-ed by the department concerned.

duation Fees

ociate in Arts $10.00
helor's, Master's, Education Specialist, Doctor's degrees 25.00
t-Master's Graduate Certificate in Health Care Administration 25.00

for Binding Master's Thesis 10.00

for Microfilm Service and Printing Announcement of Final Examination (Doctoral candidates) 60.00

sidence Hall Fees (see page 55)

ecial Fees

plication fee (undergraduate degree candidate), nonrefundable 10.00
plication fee (graduate degree candidate), nonrefundable 25.00
ition deposit, nonrefundable, charged each entering or readmitted full-ime undergraduate student 100.00
plication for room reservation, nonrefundable, charged each resident student 100.00
mission tests (when required) 6.00–12.00
tional Teacher Examinations fee, for Bachelor of Arts in Education degree candidates 9.00–13.00
te-registration fee, for failure to register within the designated period 15.00
te-payment fee, for failure to make payments when due (see "Payment of Fees," pages 31–32) 15.00

*Students in the College of General Studies are charged the University Center Fee only when registered for courses on campus.

Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," pages 31-32) $3
Returned check fee, charged a student whose check is improperly drafted, incomplete, or returned by the bank for insufficient funds .....
Continuous Registration fee, to maintain "continuous registration"* status during any semester of absence from the University or after completion of tuition requirements*—due and payable on the official days of registration .....
For special physical examination .....
Special Columbian College of Arts and Sciences departmental examination for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both .....
For each examination to qualify for advanced standing and for each special examination .....
English test for foreign students (when required) .....
Laboratory checkout fee, for failure to check out of Chemistry laboratory by the date deadline set by the instructor† .....
Transcript fee, for each transcript of record .....

Registration for on-campus courses in the University entitles each studen the following University privileges: (1) the services of the Student Ca Services Office; (2) the use of the University Library; (3) gymnasium p leges; (4) admission to all athletic contests, unless otherwise specified; (5) scription to the *University Hatchet,* the student newspaper; (6) admissio University debates; (7) medical attention as described under Student He Service. These privileges terminate when the student withdraws or is dism from the University.

PROJECTED TUITION AND FEE INCREASES 1974-77

In order that students and their parents may plan more realistically for a four-year period, tuition increases for the academic years 1974-75, 1975-76, 1976-77 have been estimated as follows:

Increase by year (full-time undergraduate students):

1974–75 ..... $
1975–76 .....
1976–77 1

‡Increase by semester hour (graduate and part-time undergraduate students):

1974–75 .....
1975–76 .....
1976–77 .....

The University Center fee will be increased for the 1974 summer ses

* Payment of the continuous registration fee entitles the student who is granted leave of a to return and continue his work toward a degree under the academic requirements which w force at the time of his first registration. The continuous registration fee applies toward tuition fee nor residence requirements for the degree.
This fee does not apply to students granted military leave, see page 47.
† A student who drops a Chemistry course before the end of the semester must check out laboratory at the next laboratory period.
‡ Semester-hour increases become effective at the beginning of the summer sessions precedi academic year.

the academic year 1974-75. For students taking 11 or more semester hours, fee will be $43.00 a semester, an increase of $5.50. Students taking less than semester hours will pay $4.00 a semester hour, an increase of $.50.

Every effort will be made to keep tuition increases within the above limits. wever, it is not possible to project future economic data with certainty, and umstances may require an adjustment in these estimates.

PAYMENT OF FEES

student is permitted to complete registration or attend classes until all rges are paid. Tuition and fees for each semester are due and payable in at the Office of the Cashier at the time of each registration. Checks and tal money orders should be made payable to George Washington University. The Student Accounts Office has responsibility for billing and maintaining dent accounts for tuition, various fees, and room and board charges. A student registered for 6 semester hours or more may sign a deferred payment ntract with the Student Accounts Office at the time of each registration permitting him to pay one-half of the total tuition and fees (except for fees payle in advance) at the time of registration and the remaining half on or before October 31, 1973 (for the fall semester), and March 6, 1974 (for the ring semester). Interest at the rate of 8 per cent per annum on the unpaid lance will be charged from the date of registration to the date payment is ade. The University will not obligate itself to notify the student, in advance, the payment-due date for the second half of the semester charges.

Students receiving tuition assistance in the form of scholarships, governent tuition contracts, or other forms of tuition awards are not permitted to gn deferred payment contracts unless the total tuition and fee charges exceed e value of the tuition awards by $525 or more. Under such circumstances e student may be permitted to pay one-half of the amount due from the udent at the time of registration and to defer the balance by signing a derred payment contract.

Students who fail to make any payment when due will be automatically harged a $15 late-payment fee and will be subject to the interest charge of 8 er cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, e student forfeits his rights to the use of deferred payment contracts in future mesters, and the Student Accounts Office will notify the Registrar to withold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement ill require payment in full of all amounts due the University in addition to a nancial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registered or credit.

Because many parents may wish some option in meeting and financing all or art of the cost of a college education, the University offers educational loan lans through the Girard Bank in Philadelphia, Pa.; Funds for Education, Inc., Manchester, N.H.; and The Riggs National Bank, Washington, D.C.

Although similar in purpose, these plans vary somewhat in coverage and

conditions. One-year and multiple-year plans are available. Insurance cove the life and health of the sponsor is provided through these plans.

Individuals over twenty-one years of age who are employed full-time also eligible to apply. They may sponsor their own contracts, provided meet the conditions specified by the plan for which they are applying.

Brochures and applications describing these plans are available in the O of Student Financial Aid.

WITHDRAWALS AND REFUNDS*

Applications for withdrawal from the University or for change in class sc ule must be made in person or in writing to the dean of the college, sch or division in which the student is registered. Notification to an instructo not an acceptable notice (see "Withdrawal," pages 45-46).

In authorized withdrawals and changes in schedule, cancellations of sem tuition charges and fees will be made in accordance with the following sche for the fall and spring semesters:

1. *Complete withdrawal from the University:*

FALL SEMESTER

Withdrawal dated on or before September 14, 1973	90 per
Withdrawal dated September 17 to September 28, 1973	75 per
Withdrawal dated October 1 to October 12, 1973	50 per
Withdrawal dated after October 12, 1973	

SPRING SEMESTER

Withdrawal dated on or before January 18, 1974	90 per
Withdrawal dated January 21 to February 1, 1974	75 per
Withdrawal dated February 4 to February 15, 1974	50 per
Withdrawal dated after February 15, 1974	

2. For a *change in status from full-time to part-time student* or for *p withdrawal by a part-time student,* the above schedule applies to the d ence in charges between the original program and the adjusted pro continuing in effect.
3. A student enrolled in an undergraduate full-time program who or adds a course and continues to be in a full-time program will ha financial adjustments of tuition made other than those involving course
4. A student who is granted military leave before completing the semeste receive credits for current charges in accordance with the schedule for plete withdrawal from the University (see No. 1 above). Payments in excess of the nonrefundable balance will be refunded to the st The nonrefundable balance will be maintained as a deferred credit f by the student when he returns to the University (see "Military L page 47).

* Regulations concerning withdrawal and refunds for the summer sessions are stated in the *Sessions Catalogue.*

egulations governing student withdrawals as they relate to residence hall nd food service charges are contained in the specific lease arrangements.

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o case will tuition be reduced or refunded because of absence from classes. ayment applies only to the semester for which a registration charge is in- ed and will not be credited to another semester (exception: students granted tary leave, see page 47).
uthorization to withdraw and certification for work done will not be given udent who does not have a clear financial record.
tudents are encouraged to provide their own cash funds until they can make king arrangements in the community.

Financial Aid

FOR UNDERGRADUATE STUDENTS*

ORGE WASHINGTON UNIVERSITY has, for undergraduate students, a program of ncial assistance consisting of scholarships, loans, grants, part-time employ- nt, or any combination of these resources. The University participates in the tional Direct Student Loan, Supplemental Educational Opportunity Grant, l College Work-Study programs. Financial aid is awarded on the basis of the dent's scholastic record, financial need, and qualities of leadership and aracter.

Applications and supporting credentials for financial aid must be filed by bruary 1 (entering freshmen), March 1 (enrolled undergraduate or en- ing transfer students) preceding the academic year of the award for the fall nester; by November 1, for the spring semester; and May 1, for the summer sion†. A student must reapply for financial aid each year.

Complete information concerning financial assistance is contained in the mphlet "Student Financial Aid," which is available at the Office of Student ancial Aid, George Washington University, Washington, D.C. 20006.

The following scholarships are available to students in Columbian College of ts and Sciences, the School of Education, the School of Government and siness Administration, and the School of Public and International Affairs. e University also offers many other scholarships which are available to stu- nts in these colleges and schools.

The George Washington University Board of Trustees Scholarships.—Full- d partial-tuition scholarships, which will begin in the fall semester and extend r four successive academic years, provided the holder maintains a *B* erage, as well as a high standard of deportment, and continues to be in ancial need. Candidates must plan to select a curriculum leading to a Bache- 's degree in any school of the University, except the College of General Stud- . Students who have demonstrated outstanding ability in interscholastic

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For information concerning financial aid for students from foreign countries, see page 39.
† Summer Sessions student is eligible for consideration only if he is enrolled in this University for least 8 semester hours in the immediately preceding spring semester or has applied for financial for the following fall semester.

speech and debate activities are eligible for the George F. Henigan Scholar
in Debate which are included among these scholarships.

SCHOLARSHIPS

Achievement Rewards for College Scientists (ARCS) Foundation, Inc., Scholarship
Sherman Page Allen Memorial Scholarship Fund (1966)
Alumni Scholarships
Mary J. Anderson Scholarship (1969)
Byron Andrews Scholarship (1920)
Henry N. Brawner, Jr., Foundation Scholarship Fund (1963)
Emma K. Carr Scholarships (1932)
Maria M. Carter Scholarship (1871)
Paul E. Casassa Memorial Foundation Scholarship (1968)
Chi Omega Alumnae Scholarship (1966)
Columbian Women Scholarship Funds
Victoria Briggs Scholarship Fund (1959)
Elizabeth V. Brown Scholarship Fund (1925)
Grace Ross Chamberlin Scholarship Fund (1932)
College Women's Scholarship Fund (1926)
Columbian Women Members' Scholarship Fund (1961)
Arline Hughes Dufour Scholarship Fund (1961)
Dr. Watson W. Eldridge, Jr., and John F. Eldridge Scholarship Fund (1
Founders of Columbian Women Scholarship Fund (1920)
Rose Lees Hardy Foundation Scholarship Fund (1957)
Lillian Young Herron Scholarship Fund (1925)
Nellie Maynard Knapp Scholarship Fund (1915)
Marcia B. Kraft Scholarship Fund (1966)
Janet McWilliams Scholarship Fund (1954)
Marie-Louise Ralph Turner Scholarship Fund (1963)
D.C. Daughters of the American Revolution Scholarship (1952)
Isaac Davis Scholarship (1869)
District of Columbia Institute of Certified Public Accountants Scholarsh Accounting (1964)
Estella Constance Drane Scholarship (1957)
Louise Smith Engel Scholarship (1972)
Robert Farnham Scholarship (1871)
Federal Government Accountants Association—Washington, D.C., Chap Scholarship in Accounting
Esther Brigham Fisher Scholarship (1951)
Foreign Student Scholarships (see page 39)
General Motors College Scholarship (1955)
Mildred Green Memorial Scholarship Fund (1959)
Anna Spicker Hampel Scholarship (1949)
Julian O. Hargrove Scholarship (1968)
Elma Lewis Harvey Scholarship (1921)
Hazleton Scholarship (1950)
George F. Henigan Scholarships in Debate (1967)
David B. and James L. Karrick, Jr., Scholarship Fund (1968)
Samuel and Elizabeth Kay Scholarships (1969)

Kendall Scholarship (1869)
e Leggette Memorial Scholarship Established by WRGW (1968)
na's Marathon Residence Hall Scholarship
ell-Stancioff Scholarship (1967)
orehouse Scholarship (1861)
Morris Education Fund Scholarships (1972)
Marie and Thomas E. Orr Scholarships (1965)
Delta Gamma Scholarship (1956)
B. and Alma D. Pletcher Scholarship Fund (1968)
M. Powell Scholarships (1886)
arch Assistantships in Operations Research and Related Fields (see page
)
dent Assistantships (see page 36)
y Whitefield Samson Scholarship Fund (1966)
M. Shepard Scholarships (1946)
a Delta Chi Foundation of Washington, D.C., Scholarships
garet Lucille Snoddy Scholarship (1970)
id Spencer Scholarship (1918)
y Lowell Stone Scholarship (1893)
rles Clinton Swisher Scholarships (1941)
Kappa Epsilon Scholarship (1959)
Office of Education Traineeships (1964)
versity Hospital Scholarships in Medical Technology
versity Players Scholarship in Memory of L. Poe Leggette (1968)
liam Walker Scholarship (1824)
gail Ann Brown and Henry Kirk White Scholarship Fund (1963)
n Withington Scholarship (1830)
men's Physical Education Alumnae Association Scholarship (1964)
liam G. Woodford Scholarship (1969)
n Woodhull Scholarship (1919)
nta Club Scholarship (1950)

ANTS

e following funds have been established to meet the special needs of disad-
ntaged students from the District of Columbia Inner-City and the Washington
tropolitan area.

orge Washington University's Educational Opportunity Program Tuition Grants (1968)
y Club of Walt Whitman High School, Bethesda, Md., Grant (1968)
arriott Foundation Grant (1968)
pplemental Educational Opportunity Grants

FOR GRADUATE STUDENTS*

ne George Washington University program of financial assistance for graduate
dents includes assistantships, fellowships, traineeships, graduate scholarships,

*For information concerning financial aid for students from foreign countries, see page 39.

research appointments, part-time employment, and loans. Application fo mission to graduate study is a prerequisite for consideration. The Univ participates in the National Direct Student Loan and College Work- programs.

Application and correspondence concerning assistantships, fellowships, eeships, or graduate scholarships should be sent directly to the dean school concerned, and addressed to George Washington University, Wa ton, D.C. 20006. Unless otherwise specified, application and supporting cr tials should be submitted no later than February 1 preceding the academi for which the award is made.

A separate application for National Direct Student Loans or the C Work-Study Program must be submitted to the Office of Student Financia by April 1 for the following academic year.

ASSISTANTSHIPS

Research Assistantships in Operations Research and Related Fields.— able to graduate students, juniors, and seniors, in any college or school University. Research Assistants are expected to work 20 hours a week ducting research in support of an established research program, in pro ming or in conducting individual research on an approved research p Stipends vary from approximately $3,300 to $6,800, depending on the of the student and the tenure of the appointment (9-12 months). Applic must be received prior to March 1. Further information and applicatio available from the Director, Institute for Management Science and Eng ing, School of Engineering and Applied Science, George Washington U sity, Washington, D.C. 20006.

Resident Assistantships (men and women).—Available to graduate stu and seniors in any field of study who are interested in working with the st personnel program in University residence halls. Specific duties vary wit position, but basically consist of counseling, advising student groups, an ministration. Remuneration includes full tuition and a furnished room f academic year. All positions are part-time, enabling staff members to enr full-time students. Application should be completed before March 1. Fu information may be obtained from the Office of the Dean of Students.

Arlington County—George Washington University Cooperative Assistan Program

Health Care Administration Research Assistantships

National League of Cities/George Washington University Assistantship

Urban Affairs Assistantship

FELLOWSHIPS, INTERNSHIPS, TRAINEESHIPS, SPECIAL PROGRAMS

The following fellowships, internships, and traineeships are available to stu in the Graduate School of Arts and Sciences, the School of Education School of Government and Business Administration, and the School of P and International Affairs. The University also offers many other fellow which are available to students in these colleges and schools. Complete i mation is contained in the pamphlet "Student Financial Aid," which is able at the Office of Student Financial Aid, George Washington Unive Washington, D.C. 20006.

aduate Teaching Fellowships.—Available to graduate students in Master's doctoral programs in most departments of the University. Each teaching v renders a designated unit of service to his major department of instruc- and receives a stipend of up to $2,800 (on a 9-month basis), plus tuition, se fees, and University Center fee.

search Traineeships.—Available under numerous sponsored programs in a ber of departments. Currently, the basic medical science departments and departments of Psychology and Speech and Drama offer such programs. nds vary; information is available from the departments and the Office of Dean of the Graduate School of Arts and Sciences.

evement Rewards for College Scientists (ARCS) Foundation, Inc., Fellow-ip
rt A. Aleshire Fellowship Fund (1971)
rican Association of Collegiate Schools of Business Fellowship
rican Civilization Fellowships
rican Civilization Internships (Smithsonian Institution-George Washington niversity Cooperative Program)
rican Iron and Steel Institute Fellowship
ur Anderson & Co. Doctoral Fellowship
field Scott Blaney Fellowship in International Affairs (1961)
mas Alva Edison Fellowship
nentary Teacher Education Internships
t & Ernst Grant to Doctoral Candidates in Business or Economics
eign Student Fellowships (see page 39)
lth Care Administration Fellowships
ard D. Irwin Doctoral Fellowships
ella Osborn King Research Fellowships (1927)
la D. Lasker Fellowships in Housing, City Planning, or Urban Renewal lon Foundation Fellowships
orities in Planning and Related Professions Program
ional Association of Purchasing Management Fellowship
ional Defense Education Act Fellowships
ional Endowment for the Humanities Fellowships
ional Historical Publications Commission-George Washington University Cooperative Research Fellowships
ional Science Foundation Graduate Fellowships
ources for the Future, Inc., Fellowship Prize
e Bibliography Internships
mas Bradford Sanders Fellowships (1928)
ttish Rite Fellowships
. Office of Education Fellowships (1964)
. Public Health Service Traineeships
. Public Health Service Traineeships in Comprehensive Health Planning
ban Studies Fellowships of the Department of Housing and Urban Develop-ment
ban Transportation Center Fellowship

ADUATE SCHOLARSHIPS

ma K. Carr Scholarships (1932)

Paul H. and Margaret M. DeMaine Scholarships (1967)
District of Columbia Institute of Certified Public Accountants Scholarsh
Accounting (1964)
Foster G. McGaw Scholarship in Health Care Administration (1971)
Mitchell-Stancioff Scholarship (1967)
Paul Pearson Scholarship Fund (1940)
Phi Delta Gamma Scholarship Fund (1968)
Voorhees Scholarships
Wolcott Foundation Scholarships

SPONSORED AWARDS FOR GRADUATE STUDY

Information regarding awards sponsored by foundations, professional
learned societies, industries, and others which may be used in suppo
graduate study is available at the Graduate Fellowship Information Cente
students enrolled at George Washington University. Information is also ava
on the prestige programs such as the Rhodes, Marshall, Woodrow Wilson
bright, Rotary International, and Danforth, as well as many others.

As deadlines for application vary, qualified students should make inq
well in advance of the year of planned graduate study.

LOAN FUNDS

The following loan funds are available to undergraduate and/or graduate
dents in Columbian College of Arts and Sciences, the Graduate School of
and Sciences, the School of Education, the School of Government and Bu
Administration, and the School of Public and International Affairs. Com
information is contained in the pamphlet "Student Financial Aid," wh
available in the Office of Student Financial Aid, George Washington Univ
Washington, D.C. 20006.

American Medical Association Nursing Home Administration Loan Fu
Foreign Student Loan Fund (1967)
W. K. Kellogg Foundation Hospital Administration Loan Fund
Jessie B. Martin Loan Fund (1967)
National Direct Student Loan Program
Ellis H. Stearman Emergency Loan Fund
U. S. Loan Program for Cuban Students
University Student Emergency Loan Fund

STUDENT EMPLOYMENT

The Student and Alumni Career Services Office maintains a registry o
full-time and part-time positions available in the Washington area for
graduate and graduate students.

After registration, students may apply at the Student and Alumni
Services Office, Woodhull House, 2033 G Street, N.W., for interviews a
ferrals to positions for which they are qualified.

FOREIGN STUDENTS

rgraduate foreign students with proven financial need who have completed emester of full-time work (15 hours) at this University with a *B* average ligible for consideration for the Board of Trustees Scholarships. Scholar- are awarded in the spring for the following academic year. See instruc- for applying for undergraduate financial aid, page 33.

mited awards for graduate teaching fellowships are the responsibility of the rman of the department or dean of the school in which the degree is to be ed. Work as a teaching fellow requires excellent knowledge of English— spoken and written.

ng-term loan funds for undergraduate and graduate foreign students are ed in amount and are available only to those foreign-born persons who have blished resident status in the United States through the Immigration and uralization Service.

e suggest that students who wish to study in the United States have avail- sufficient funds to cover expenses for one full year before attempting to r a college or university. The cost at this University for one academic year ptember-May) is approximately $5,000. This estimate includes room and rd, tuition, books, clothes, and incidental expenses; no travel, holiday, or lical expenses are included.

LAW ENFORCEMENT EDUCATION PROGRAM

s program of grants and loans, authorized under the provisions of the Omni- Crime Control and Safe Streets Act of 1968, is intended to help pay the t of educational expenses of officers who are employed by publicly funded enforcement or correctional agencies. Studies may be full- or part-time in ide range of subject areas and degree goals. Priority will be given to officers the state and local levels, and to veterans of the Armed Forces of the United tes. Applications and further information are available from the LEEP Co- inator, Earl J. Ross, in the Department of Forensic Science.

Prizes

Accounting Prizes.—Three prizes awarded annually by the Department of counting—one each to the undergraduate Accounting major with the highest holastic standing, to the candidate for the degree of Master of Business Ad- nistration with the highest scholastic standing in the Accounting concentra- n, and to the Doctoral candidate with a field in Accounting who has the ghest scholastic standing at the completion of the General Examination.

Alpha Chi Sigma Prize.—Awarded annually by the Alpha Pi Chapter to the dent who has attained the highest academic record in courses in chemistry. e name and year of graduation of the student is inscribed on a bronze que. The winner must have had at least 16 hours in chemistry, including the al semester at this University.

Alpha Kappa Psi Prize.—A key, awarded annually by Beta Mu Chapter to e male student who has completed 90 semester hours at this University and

attained the highest average grade in business administration, economics, national business, public accounting, and public finance. The name of the ner and the year of the award are engraved on a plaque in the Office Dean of the School of Government and Business Administration.

American Institute of Chemists Prize.—A medal awarded annually t graduating student majoring in chemistry who excels in scholarship, inte and leadership.

Department of Art Prizes.—Two prizes—one for an undergraduate ma in Art History and one for an undergraduating majoring in Fine Arts—aw annually to the most promising students, as determined by the departm faculty.

The Walter G. Bryte, Jr., Achievement Award.—Provided by Walte Bryte, Jr., Colonel, U.S. Air Force (retired), first Professor of Air Scien George Washington University. The award is presented annually primar that undergraduate residence hall, secondarily to any other activity at the versity, which has shown, under the leadership of its elected or designated the most improvement or excellence in its support of the principles and of the United States of America and George Washington University. Th or other activity will be awarded a cash prize, and the name of its leade his hall or activity will be engraved on a silver trophy.

Byrne Thurtell Burns Memorial Prize.—Awarded to the senior major chemistry who shows the greatest proficiency in organic chemistry, as evid by a comprehensive examination, and who possesses such qualificatio mind, character, and personality as to give promise of future achievemen

Business Administration Prize.—Awarded annually by the Departme Business Administration to the outstanding graduating senior in the accou or business administration degree program on the basis of scholarship, le ship, and service to the University.

Wilbur J. Carr Prize.—Established in 1962 by Edith K. Carr, former tee of the University, in memory of her distinguished husband, who was uated from the School of Comparative Jurisprudence and Diplomacy in It is awarded annually to that man in the graduating class of the Univ who has demonstrated outstanding ability in his study of international and who has given evidence of possessing in marked degree the qualities produce the good citizen and the dedicated public servant.

The Chemical Rubber Co. Freshman Chemistry Achievement Priz Handbook of Chemistry and Physics awarded annually to the freshman st who has demonstrated the greatest achievement in Chemistry 15-16.

The Columbian Women Prize.—Awarded to the senior woman who undergraduate life has most nearly fulfilled the objectives of Columbian Wo

John Henry Cowles Prizes.—Two prizes, established by John H. C Grand Commander of the Supreme Council of Thirty-third Degree (M Council of the World) of the Ancient and Accepted Scottish Rite of masonry, Southern Jurisdiction of the United States of America. Aw annually to the senior in the School of Government and Business Admin tion and to the senior in the School of Public and International Affairs the highest academic averages.

DeWitt Clinton Croissant Prize.—Awarded annually to the undergra student enrolled in a course in drama or active in University dramatics submits to the English Department the best essay on drama or the theatre

K. Cutter Prize.—Established by Marion Kendall Cutter "for excellence
e study of English." Awarded to the member of the graduating class whose
d in English, combined with general excellence, shows most marked apti-
for and attainment in English studies.

ac Davis Prizes.—Established in 1847 and awarded annually to the three
rs who have made the greatest progress in public speaking while enrolled
e University. Awards are to be determined by a public-speaking contest
hich the participants deliver original orations. Only members of the senior
of Columbian College of Arts and Sciences who are candidates for the
ee of Bachelor of Arts or Bachelor of Science are eligible to compete.

enry Grattan Doyle Memorial Prize.—Established in memory of Henry
tan Doyle, a former Dean of Columbian College. Awarded annually to
utstanding senior for excellence in Spanish.

lton Prize.—Established by the Reverend Romeo Elton, of Exeter, Eng-
, and awarded annually to the student with the highest average in the most
nced course in the Greek language and literature.

sse Frederick Essary Prize in Journalism.—Established by Helen Essary
rphy and awarded annually to a student who has given promise of sound
enship and who submits the best printed and published evidence of ability
forthright reporting" and good journalistic writing, in a student publication
lsewhere.

oshua Evans III Prize in Political and Social Sciences.—A memorial prize
ablished by friends because of an outstanding life." Awarded annually to
man in the graduating class "who has demonstrated his signal ability in
social and political sciences and who has given promise of the interpreta-
of that ability in good citizenship among his fellows."

Willie E. Fitch Prize.—Established by James E. Fitch in memory of his son.
arded annually to a senior student for the best examination in chemistry.

Alice Douglas Goddard Prize.—A memorial established by Frederick Joseph
ddard, of Georgetown, D.C. Awarded annually to the senior student mak-
the highest average in American literature.

Edward Carrington Goddard Prize.—Established by Mary Williamson God-
rd, Alice Douglas Goddard, and Frederick Joseph Goddard, of Georgetown,
C., in memory of Edward Carrington Goddard, class of 1881. Awarded to
junior or senior student making the highest average in the French language
d literature.

Morgan Richardson Goddard Prize.—A memorial established by Mary Wil-
mson Goddard, Alice Douglas Goddard, and Frederick Joseph Goddard, of
eorgetown, D.C. Awarded to the junior or senior student making the highest
erage in the following fields: business administration, economics, interna-
nal business, or public accounting.

Gardiner G. Hubbard Memorial Prize in United States History.—Established
Gertrude M. Hubbard in memory of her husband and awarded annually to
at member of the graduating class majoring in history who has maintained
e highest standing in courses in United States history.

International Business Prize.—Two prizes awarded annually by the School
Government and Business Administration to students specializing in inter-
ational business, one awarded to a graduating senior and one awarded to a
raduate student.

Kappa Kappa Gamma Prize.—Awarded annually to a full-time freshma sophomore student for excellence in Biological Sciences 12.

David Lloyd Kreeger Prizes in Art.—Five prizes given by Mr. Kreeger, in the fine arts and two in art history (including museology). Fine arts p are awarded to a senior or graduate student in painting, sculpture, and gra or design. One prize in art history is awarded to a senior and one to a grad student. Candidates for the prizes must submit original papers or works o Winners are selected by distinguished representatives of the field of art i Washington, D.C., area.

Minna Mirin Kullback Memorial Prize.—Established in 1968 by Sol Kullback in memory of his wife. Awarded annually by a committee of fa members of the Department of Statistics to a full-time undergraduate or uate student majoring in statistics, who will have completed 18 semester of statistics courses by the end of the spring semester.

Hilda Haves Manchester Prize in Sociology.—Established in honor of Haves Manchester, B.A. 1932, an outstanding student whose major field Sociology. Awarded annually by Columbian College of Arts and Scienc the senior woman student majoring in Sociology who has the highest scho record.

Vivian Nellis Memorial Prize.—Awarded to a student in the English De ment who has shown special promise in the field of creative writing.

Phi Delta Kappa Prize.—Awarded annually by Beta Gamma Chapter t outstanding senior man in the teacher education program in the School of cation.

Phi Eta Sigma Prize.—A choice book selected from the field of the r ent's major, awarded annually by the George Washington University Ch to the male student attaining the highest scholastic average in his first semester of work. The winner's name is engraved on a plaque in the Offi the Dean of Columbian College of Arts and Sciences.

Pi Lambda Theta Prize.—Awarded annually by Alpha Theta Chapter t outstanding senior woman in the teacher education program in the Scho Education.

Psi Chi Prizes.—Two prizes awarded annually by the George Washin University Chapter to the best undergraduate student in experimental psy ogy and to the M.A. degree candidate or second-year graduate student su ting the best thesis or research project in psychology.

Ruggles Prize.—Established by Professor William Ruggles in 1859, aw annually to a candidate for a Bachelor's degree for excellence in mathem

Hermann and Johanna Richter Schoenfeld Prize.—Established in gr appreciation of the inspired teaching and devotion to his students of Dr. mann Schoenfeld, who for more than 20 years until his death in 1926 he the Department of German. Hermann Schoenfeld, Ph.D., LL.D., was w recognized as a scholar of distinction whose presence on the faculty prestige to the University. This prize is given annually to a member o graduating class for excellence in historical and cultural phases of Ger studies.

Society of Colonial Wars in the District of Columbia Prize.—A gold m awarded to a candidate for a graduate degree who, in the judgment of the ulty of the Department of History, submits a thesis or dissertation demons ing excellence in historical research in American Colonial history. The Un

serves the right to withhold the award if no thesis or dissertation attain-
e required degree of excellence is submitted.

ghton Prize.—Established by the Reverend Romeo Elton and awarded
lly to the student making the best record in the most advanced course in
tin language and literature.

es MacBride Sterrett, Jr., Prize.—Established in 1911 by Professor Ster-
memory of his son. Awarded annually to the student who obtains the
t average in Physics 1 and 2.

rles Clinton Swisher Historical Club Prize.—Established in 1936 by the
es Clinton Swisher Historical Club and augmented in 1941 by the bequest
ofessor Swisher. Awarded annually to the student who submits the best
covering some phase of medieval history.

njamin D. Van Evera Memorial Prize.—Awarded annually to that Gradu-
eaching Fellow in Chemistry selected as the most effective teacher during
urrent academic year.

e Wall Street Journal Leadership Prize.—Awarded annually to a graduat-
enior in the Bachelor of Business Administration degree program for
anding leadership and service to the University.

omas F. Walsh Prize.—Established in 1901 and awarded annually to the
nt who submits the best essay in Irish history.

exander Wilbourne Weddell Prize.—Established in 1923 by Virginia Chase
dell in memory of her husband. Awarded annually to a candidate for a
ee who writes the best essay on the subject of "the promotion of peace
ng the nations of the world." The prize essays shall become the property
ne University and shall not be printed or published without the written
ent of the University. The University reserves the right to withhold the
rd if no essay attaining the required degree of excellence is submitted.

Regulations

TUDENT ENROLLED in the University is required to conform to the follow-
regulations and to comply with the rules and regulations of the college,
ool, or division in which he is registered.

A student who withdraws or is suspended, or is otherwise absent from the
iversity for one semester or more, may re-enter and continue his work only
der the rules and regulations in force at the time of his return.

f a student knowingly makes a false statement or conceals material infor-
tion on an application for admission, registration card, or any other Univer-
document, his registration may be cancelled. If such falsification is dis-
vered after the student has established an academic record at the University,
may be subject to dismissal from the University. Such a student will be
ligible (except by special action of the Faculty) for subsequent registration
the University.

TTENDANCE

student may not attend classes until registration is completed and fees due
e paid. He may attend only those classes for which he is registered. Regu-

lar attendance is expected. A student may be dropped from any course undue absence.

SCHOLARSHIP REQUIREMENTS

A student who fails to maintain the scholarship requirements of the co school, or division in which he is registered may be dismissed from the versity.

GRADES

Grades are mailed to the student through the Office of the Registrar a close of each semester. They are not given out by instructors.

UNDERGRADUATE

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Averag Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal; *CR*, Credit; *NC* Credit. Except for courses which specifically state that repetition for cre permitted, a candidate for a degree at this University may not repeat for c a course in which he has received a grade of *D* or better, unless required t so by the department concerned. A written statement to this effect mu submitted to the Registrar by the appropriate department chairman.

GRADUATE

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Mini Pass; *F*, Fail; *I*, Incomplete; *CR*, Credit; *W*, Authorized Withdrawal. E for courses which specifically state that repetition for credit is permitt candidate for a degree at this University may not repeat for credit a cou which he has received a grade of *C* or above, unless required to do so b department concerned. A written statement to this effect must be submitt the Registrar by the appropriate departmental chairman. In the Gra School of Arts and Sciences this regulation is slightly different (see page

INCOMPLETE/AUTHORIZED WITHDRAWAL

Whenever a grade has not been assigned, the symbol *I* (Incomplete) symbol *W* (Authorized Withdrawal) will be recorded. The symbol *I* ind that a satisfactory explanation has been given the instructor for the stu failure to complete the required work of the course. At the option of t structor, the grade of *I* may be recorded if a student, for reasons beyo control, is unable to complete the work of the course, and if the instruc informed of, and approves, such reasons before the date when grades m reported. The grade may be used only if the student's prior performanc class attendance in the course have been satisfactory. Any failure to co the work of a course which is not satisfactorily explained to the inst before the date when grades must be turned in will be graded *F*. If acce reasons are later presented to the instructor, he may initiate an appro grade change.

MOVING AN INCOMPLETE

information concerning the removal of a grade of Incomplete from a stu-t's record, consult the regulations of the college, school, or division con-ned.

E QUALITY-POINT INDEX*

olarship is computed in terms of the quality-point index, obtained by divid- the number of quality points by the number of semester hours for which student has registered, both based on his record in this University. Quality nts are computed from grades as follows: *A*, four points; *B*, three points; two points; *D*, one point; *F*, no points, for each semester hour for which student has registered. Courses marked *W*, *I*, *NC*, or *CR* are not con-ered in determining the index, except that courses marked *I* will be con-ered when a formal grade is recorded. An incomplete which is not removed hin one calendar year is automatically changed to an *F*. Grades in courses en at another institution are not considered in computing the quality-point lex.

NAL EXAMINATIONS

nal examinations for undergraduate courses are scheduled at the end of each mester by the Office of the Registrar. Examinations for courses numbered 1 or above are scheduled, if desired, by the individual department or instruc-r.

CADEMIC DISHONESTY

cademic dishonesty on the part of any student will result in a disciplinary ade of *F* for the course involved and also may, upon the recommendation the appropriate dean's council, result in his suspension from the University r a stated period, at the end of which time he may petition for readmission. pon approval of the appropriate dean's council, the disciplinary grade of Failure—Academic Dishonesty" will be recorded for the course involved, and is grade will be employed in the computation of the quality-point index or cademic standing. A student so suspended shall be withdrawn from all other ourses except those in which all work has been completed.

VITHDRAWAL

Withdrawal from a course or from the University requires the permission of he dean of the college, school, or division in which the student is registered. ermission to withdraw from the University will not be granted a student who oes not have a clear financial record (see pages 32-33).

Each college, school, and division of the University sets deadline dates for ach semester concerning withdrawal. Withdrawal between these dates and the nd of the semester is permitted only in exceptional circumstances.

All charges for courses dropped without the approval of the dean must be

* Applicable only to the Graduate School of Arts and Sciences, the School of Education, the School f Government and Business Administration, and the *graduate programs* in the School of Public and nternational Affairs.

met by the student. Reporting the dropping of a course to an instructor not effect its discontinuance.

CHANGES IN PROGRAM OF STUDY

Changes within a College, School, or Division.—A student may not su tute one course for another, drop courses (see "Withdrawal," page 45), ch his status from credit to audit or audit to credit without the approval of dean of the college, school, or division in which he is registered.

Change from one section to another of the same course may be made the approval of the dean and the department concerned.

Change from one major subject to another within the same college or sc may be made with the approval of the dean. All requirements of the co of study to which the change is made must be met.

Transfer within the University.—Application for transfer to another col school, or division must be made to the appropriate admitting office on the provided by the deans concerned. Transfer from the appropriate preprofess curriculum in Columbian College to Bachelor's degree candidacy in the Sc of Education or the School of Public and International Affairs is automati completion of 60 or more semester hours of course work.

A maximum of 45 semester hours earned in the Division of University dents may be applied toward a Bachelor's degree in a degree-granting colle school of the University. Work done in the Division of University Stu will not be counted toward a graduate degree unless prior written appr obtained from the relevant degree-granting college or school, has been file the Office of the Dean of the Division of University Students (see page

Students transferring within the University are advised to study carefully graduation requirements on pages 47-48 and to note that, unless othe specified, in all undergraduate divisions, 30 semester hours, including at *12 semester hours* in the major field, must be completed while registere the school or college from which the degree is sought. Upon transfer student should consult the dean concerned and understand clearly the req ments he must fulfill.

CREDIT

Credit is given only after registration for a course and satisfactory compl of the required work, or upon the assignment of advanced standing in ac ance with the regulations of the several colleges, schools, and divisions.

Auditing.—A person who has been admitted to the University ma registered, with the permission of the instructor, as an "auditor" in a (no academic credit). An auditor is not required to take active part or to examinations. A student who takes a course as an auditor may not repe later for credit.

SUMMER SCHOOL CREDIT

A student who plans to attend summer school at another institution and credit so earned toward graduation from this University must first secur written approval of his dean. In no event will credit in excess of what be earned in a similar period in this University be recognized.

ANCE SHEET

equest, the Registrar will issue to undergraduate degree candidates a bal- sheet showing the amount of work completed and the requirements re- ing to be met for the degree. A second balance sheet is issued only if the ent changes major or degree objectives.

NSCRIPTS OF RECORD

ial transcripts of student records are issued on request of the student or ner student who has a clear financial record. A fee of two dollars is charged each transcript.

NTINUOUS REGISTRATION

gree candidates are expected to maintain continuous registration until *all* de- e requirements are satisfied. Students who have completed course registra- (including the thesis) must maintain continuous registration by paying the ntinuous registration" fee (see page 30). By failing to register for one nester or more, the student breaks his registration and must be readmitted e "Readmission," page 25). A "Readmitted Student" is required to satisfy curriculum requirements existing at the time of his readmission.

Students must be registered during the summer if they are taking courses, taking required examinations, are receiving guidance on theses or dis- tations, or are expecting to graduate at the end of the summer Sessions.

LITARY LEAVE

student called to active duty may be granted military leave for the period of tive duty, upon presentation to his dean of a copy of his orders and a peti- n for such leave. The maintenance of "continuous registration" is not re- ired of the student on military leave; however, he must apply for readmis- on to the University well in advance of the semester in which he expects to turn. Payments for tuition and fees which are not refunded to the student at e time he is granted military leave will be maintained as a deferred credit for s account and use upon his return to the University.

RADUATION REQUIREMENTS

egrees are conferred in February, May, and September.

To be recommended by the Faculty for graduation a student must have met e admission requirements of the college or school in which he is registered; ompleted satisfactorily the scholarship, curriculum, residence, and other re- uirements for the degree for which he is registered; and be free from all in- ebtedness to the University. Registration, either for course work or on the continuous registration" fee basis, is required for the semester or summer ses- ion immediately preceding the awarding of a degree.

Application for Graduation.—An "Application for Graduation" form *must* e filed and the appropriate fee paid at the time of registration for the last se- nester or summer session of the senior or final year. Students completing de- ree requirements during the Summer Sessions will be awarded diplomas (no ormal convocation) September 30, *provided* they have completed all degree

requirements and have applied for graduation as a part of registration fo Summer Sessions.

Scholarship.—The student must meet the scholarship requirements fo particular degree for which he is registered.

Curriculum.—Minimum curriculum requirements for each degree are s under the college or school offering work in preparation for the degree.

Residence.—Unless otherwise specified, in all undergraduate divisions o University, *a minimum of 30 semester hours, including at least 12 hours i major field, must be completed while registered in the school or college which the degree is sought.* This requirement applies to students transfe within the University as well as to students transferring from other institu Unless special permission is granted by the dean of the college or school cerned to pursue work elsewhere, the work of the senior or final year mu completed in the college or school from which the degree is sought.

The graduate student must meet the residence requirements for the pa lar degree for which he is registered.

National Teacher Examinations.—All candidates for the degree of Bac of Arts in Education are required to take the National Teacher Examina

Attendance and Conduct.—The University reserves the right to refu confer a degree upon a candidate whose attendance or conduct has bee satisfactory.

Thesis or Dissertation.—A thesis or dissertation submitted in partial sat tion of requirements for a degree must be presented in its final form t dean of the college or school concerned no later than the date specified i University Calendar.

Accepted theses and dissertations, with accompanying drawings, becom property of the University and are deposited in the University Library, w the duplicate copies are bound and made available for circulation. Se appropriate college or school in this catalogue for regulations governing t and dissertations.

HONORS

WITH DISTINCTION

In all undergraduate divisions of the University the degree may be con "With Distinction," at the discretion of the faculty, if a student meets th cific requirements of his college or school, as follows:

1. Columbian College of Arts and Sciences or School of Public an ternational Affairs—the attainment of the grades of *A* in 60 per cent courses taken at this institution; or

2. School of Education or School of Government and Business Admi tion—the attainment of a quality-point index of 3.50 or higher on all work taken at this institution.

To be eligible, a student must have completed at this institution at leas half of the courses required for the degree.

SPECIAL HONORS

Special Honors may be awarded by the Faculty to any member of the gra ing class for outstanding achievement in the student's major field on r

ndation of the major department. The student must fulfill all of the follow-
requirements:
. He must have his candidacy for Special Honors approved by the faculty
mber representing the major department or field not later than the begin-
g of the senior year.
2. He must meet such other conditions as may be set at the time his can-
acy is approved.
3. He must have completed at this institution at least one-half of the courses
uired for the degree.
4. He must fulfill the specific requirement of the college or school in which
is registered, as follows: (a) Columbian College of Arts and Sciences or
School of Public and International Affairs—attainment of the grades of
or *B* in 50 per cent of the courses taken at this institution; or (b) the
hool of Education or the School of Government and Business Administra-
n—maintain a quality-point index of at least 3.00 on all course work taken
this institution.

PARTMENTAL HONORS

he Department of History offers Departmental Honors if students meet specific
quirements. For details, see the Department of History.

HE LIBRARY

ll students registered in the University have the privilege of using the Uni-
rsity Library. Its stacks are open, and all students are welcome to browse at
eir leisure. The Student Identification Card must be presented when books are
rrowed for outside use.

The loan period for most books available for outside circulation is 30 days.
fine of 25 cents is charged for each day a book is overdue. Any book which
rculates is subject to recall by the Library if needed for reserve or other use.
eserve books must be used in the reserve reading room when the Library is
pen, except that they may be withdrawn for overnight use beginning at 8:30
m. A fine of 50 cents is charged for each hour or fraction thereof that a
serve book is overdue. Grades of a student are withheld until his library
cord is clear.

All students using the University Library are expected to be familiar with its
etailed regulations, available on application to any of the Library's service
esks.

IGHT TO DISMISS STUDENTS

he right is reserved by the University to dismiss or exclude any student from
he University, or from any class or classes, whenever, in the interest of the
tudent or the University, the University Administration deems it advisable.

IGHT TO CHANGE RULES

he University and its various colleges, schools, and divisions reserve the right
o modify or change requirements, rules, and fees. Such regulations shall go
nto force whenever the proper authorities may determine.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs with notice whenever circumstances warrant such changes.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

In general, the policy of the University is one of attempting to keep the dent's record confidential and out of the hands of those who would use it other than legitimate reasons. At the same time, the policy must be flex enough not to hinder the student, the University, or the community in t legitimate endeavors.

No information concerning a student will be released except as noted bel

1. Information such as whether or not the student is currently enrolled; d of attendance; verification of date and place of birth; degrees earned (if a date, major field or area of concentration, and honors received; home and l addresses and telephone numbers; school, college, or division of enrollment, class; verification of signature; name and address of parent or guardian.

2. The issuance of formal transcripts of record to recognized institution higher learning; the certification of academic achievement to the various re nized professional associations (law, medicine, engineering, education, etc.

Additional information will be released only on written authorization f the student, or by court order or subpoena. If a subpoena is served, the dent whose record is being subpoenaed will be notified and the subpoena be referred to the University's legal counsel.

Government investigative agencies have no inherent right to access to dent files and records. If expressly requested, properly identified repres tives from federal, state, or local government agencies may be given the i mation listed under No. 1, above.

UNIVERSITY POLICY ON SELECTIVE SERVICE INFORMATION

The University notifies draft boards of a student's academic status only the student requests or authorizes, in writing, that the draft board be not An undergraduate student desiring certification for the Selective Service Sy must go to the Registrar's Office and complete the Selective Service Inform Card which authorizes the University to notify his draft board of his full enrollment. It is the student's obligation to complete this card if he want draft board to know that he is registered as a full-time student.

This card contains the following statement:

> By my signature below, I hereby authorize the University, to notify draft board of my academic status in the University, or of any chang academic status that occur during this semester.

National Law Center students and students in the School of Medicine s check with the appropriate dean's office for details of the policy in their sc

PROPERTY RESPONSIBILITY

The University is not responsible for the loss of personal property. A and Found" Office is maintained on campus in the Safety and Security

CENTLY ESTABLISHED REGULATIONS

Appendix (pages 505-7) contains regulations recently approved by the iversity's Board of Trustees.

Consortium of Universities of the Washington Metropolitan Area, Inc.

E UNIVERSITIES in Washington, D.C.—American University, Catholic Uni-rsity of America, *George Washington University,* Georgetown University, d Howard University—are associated in a Consortium through which they ordinate the use of their respective facilities; District of Columbia Teachers llege, Gallaudet College, and Trinity College are associate members of the nsortium. Students in approved programs leading to degrees in any one of se institutions have the opportunity to select from the combined offerings of the particular courses which best meet their needs.

Participation is limited to campus degree candidates. The following, how-er, are excluded: students in Canon Law, Dentistry, Medicine, and Theology. w students are also excluded from participation, except for candidates for e degree of Master of Laws at George Washington University and George-wn University.

In special courses involving private instruction (such as music or art) or torial study, if a special fee is charged, this fee is not covered by the Con-rtium agreement and must be paid by the individual student to the institution dministering the course. A student interested in registering for Reserve Officer raining Corps (ROTC) courses should consult the Registrar at his institution.

Students are encouraged to study the announcements of programs of all the rticipating institutions. See pages 27-28 for information concerning registration r Consortium courses. *A student may not take courses at another institution at are available at his own.*

Registration forms and instructions are available from the registrar of the stitution in which the student is enrolled. The student registers and pays at his wn institution for all Consortium courses.

The Speech and Hearing Clinic

Director of Speech Pathology and Audiology J.W. Hillis

HE SPEECH AND HEARING CLINIC offers diagnostic and remedial work for chil-ren and adults with such communication difficulties as stuttering, lisping, cleft-alate speech, and cerebral-palsied speech; and with voice, articulatory, and earing problems. Diagnostic and remedial work is also available for persons with nonstandard language usage due to such conditions as hearing loss, brain damage, mental retardation, and environmental factors.

Fees.—The fee for an initial evaluation is $20. Fees for additional spe
ized testing are dependent on the testing involved. The fees for indivi
speech or hearing therapy range from $3 to $10 a session. Fees are red
for full-time students enrolled in the University and for persons receiving g
therapy. Fees are payable at the Office of the Cashier.

The Reading Center

Director Mary Ellen Coleman

THE READING CENTER offers individual diagnostic and corrective services fo
levels: primary, elementary, secondary, and adult. In addition, special rea
improvement classes are conducted for high school and college studen
well as other adults.

A complete diagnosis includes psychological tests; vision, hearing, d
nance, and spelling tests; and various types of reading achievement and
tude tests. Results are interpreted, and a written report is presented in
ference with the parents or the individual.

The special reading improvement classes for high school students, co
students, and other adults are offered throughout the year at stated inte
Emphasis is placed on improvement of vocabulary, speed, comprehension,
study skills. Instruction in spelling is also provided as needed. Mechanical
such as the tachistoscope, rate accelerator, and controlled reader are ava
for increasing speed of comprehension.

Fees.—The fee for individual diagnosis is $90; for individual instruction
a lesson; for semi-individual instruction, $7 a lesson; for instruction in
groups, secondary level, $6 a lesson. Reading classes (15 two-hour sess
are offered for adults, $140; for full-time George Washington University
dents and faculty, $65. All fees are payable in advance at the Office o
Cashier.

Veterans Education

THE OFFICE OF THE REGISTRAR, Luther Rice Hall, 2121 Eye Street, N.W.
sists students entitled to educational benefits as veterans or war orphans
any problems which may arise concerning their benefits. This Office also
esses certification of enrollment and attendance to the Veterans Administra
so that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or war orphans sh
consult the Office of the Registrar prior to submitting application to the Ve
ans Administration. All such students should obtain the instruction sheet is
by the Office of the Registrar, which sets forth requirements to be fulfi
before certification of enrollment can be made to the Veterans Administra
and which includes other information of general interest.

The Veterans Administration is at 2033 M Street, N.W., Washington,
20421.

University Computer Center

Director R.E. Thomas

UNIVERSITY COMPUTER CENTER is located on the first floor of Stuart Hall, 3 G Street, N.W. The facilities of the Center are available for academic poses to all registered students and to members of the instructional staff. Center has as its principal mission the provision of a powerful computing em which serves the University in its educational, research, and administra- endeavors. The Center's programming staff concentrates its efforts in con- ting faculty and staff seminars, consulting with users in the design and pre- ation of complicated programs, and carrying out computer-oriented research. The Computer Center equipment consists of an IBM system 370 Model 145 nputer with large capacity on-line disk storage, a card read/punch, a high- ed line printer, and four tape drives. The principal languages available to the r are FORTRAN IV, COBOL, Programming Language One (PL/I), As- bler Language, and ALGOL. In addition, numerous utility, statistical, data nipulation, and simulation systems and special languages are available in the ary of programs. Facilities are available on a first-come, first-served basis for paration of programs and data.

Computer programming courses are offered by the School of Government l Business Administration, the Department of Statistics, and the School of gineering and Applied Science. In addition, many other departments offer rses that utilize the computer as a research adjunct to course work.

The Computer Center is normally open 24 hours a day.

Continuing Education for Women

E OFFICE OF CONTINUING EDUCATION FOR WOMEN, 2130 H Street, N.W., ists women who wish to return to academic study. Brochures are available scribing programs.

General Alumni Association

IE OBJECTIVES OF THIS ASSOCIATION are to unite the graduates who wish to sociate themselves for charitable, educational, literary, and scientific pur- ses, and to promote the general welfare of the University.

Eligible members are those who have matriculated in any school of the Uni- rsity and who have left the University in good standing, or any person who or has been a member of the teaching, research, or administrative staff of the niversity, or of the Board of Trustees of the University. Active members are ose who are life members of the George Washington University General lumni Association or the Alumni Association of any school of the University, are current contributors to the George Washington University Fund.

All alumni are urged to keep the Alumni Office informed of changes of ad- ress or occupation and to supply information with regard to their fellow umni.

STUDENT LIFE

Vice President for Student Affairs W.P. Smith, Jr.
Assistant to the Vice President for Student Affairs K.E. Bumgarner
Director of the Cloyd Heck Marvin Center B.C. Bell
Dean of Students Marianne Phelps

THE OFFICE OF THE VICE PRESIDENT FOR STUDENT AFFAIRS develops stu
life programs, policies, and procedures to complement the University's fo
instruction program. These activities are implemented through the office
the Cloyd Heck Marvin Center, Counseling Center, Dean of Students, Ed
tional Opportunity Program, Housing, International Students, Student Activ
Student and Alumni Career Services, and Student Health Service.

STUDENT SERVICES

OFFICE OF THE DEAN OF STUDENTS

Dean of Students Marianne Phelps
Assistant Dean of Students Barbara Lembcke

The Office of the Dean of Students provides counseling and information t
general student body and assists in program development on campus, par
larly in the residence halls. Since the members of the staff of this Office
well informed on University policies and all student services provided on
pus, they are able to provide referrals or answers to questions. The Dea
Students works with the Adviser to International Students, the Director o
Counseling Center, the Director of the Educational Opportunity Program,
the Director of Housing in the implementation of their programs.

HOUSING

Director of Housing Ann Webster
Assistant Directors of Housing Gail Hanson, David Longanecker, George R

Complete information concerning the University's residence halls is ava
from the Director of Housing, George Washington University, Washin
D.C. 20006. Information concerning off-campus housing near the Univ
may be obtained at this Office. The reservation of rooms in private h
must be made by students.

Admission to the University does not include a room reservation. The
dent will receive, with his notification of acceptance, University residence
information, an application for residence hall space, a medical examin

, and a declaration of intent to attend the University. The medical exami-
n form must be completed by the applicant and his physician and returned
e Student Health Service Office. The application for residence hall space
be accompanied by a $100 *nonrefundable deposit*. The housing deposit is
ited toward the first semester's room charge. Rooms are leased for the
emic year, and lease payment must be made by July 15 for the fall semester.

-74 Residence Hall Rates per Person for Two Semesters*

Men:	
ms Hall	
double room	$800
triple room	750
oun Hall	
double room	825
triple room	775
Women:	
ng Hall	
single room	875
double room	825
Men and Women:	
wford Hall—double room	775
chell Hall—single room	875
rston Hall	
double room, triple room, large room for four	825
suite for six	775
duate Men and Women Only:	
duate Hall—apartment for three	875
dison Hall—double room	825

OD SERVICE

sident freshmen and sophomores are required to participate in the food
vice plan. Freshmen must participate in the seven-day, 20 meals per week
n, at the rate of $700* for the academic year. Sophomores may elect either
20-meal plan or a five-day meal plan, 15 meals Monday through Friday,
$665* for the academic year. Each plan is optional for junior, senior, and
duate students. Food service payment does not cover University intersession
vacation periods. All meal cards admit bearer to the dining room in Thurston
ll and the second floor contract dining room in the Cloyd Heck Marvin
nter.

UNSON HALL APARTMENTS

unson Hall is a University-owned and operated apartment house containing
one-bedroom and 54 efficiency apartments. Graduate and married students
e given priority for residency until July 15 each year. Seniors and juniors
ho have lived at least one year in University residence halls will be consid-
ed for residency after that date if space is available. All leases are for 12
onths.

*Residence hall and food service prices subject to change.

EDUCATIONAL OPPORTUNITY PROGRAM

Director W.T. Trent
Counselor Yvonne Thomas

The Educational Opportunity Program is designed to offer a college educa primarily to black and other minority students who are graduates of Dis of Columbia high schools and/or other qualified District residents. It prov an opportunity for a student to seek a degree in almost any field and at same time receive academic and/or financial assistance.

CLOYD HECK MARVIN CENTER

Director B.C. Bell
Assistant Director D.L. Cotter
Financial Officer L.R. Moore

The Cloyd Heck Marvin Center serves as the campus community center, viding services, conveniences, and recreational and social opportunities students, faculty, staff, alumni, and guests. Its wide range of facilities pro the setting for a variety of programs conducted by the University Prog Board; the departments of Drama, Dance, and Music; and other student faculty organizations.

A two-board structure, representative of all elements of the Unive community, plays an important role in the day-to-day functioning of the Ce The Governing Board and the Operations Board work closely with the full staff in the development of procedures and policies which provide a frame for the Center's operation.

STUDENT HEALTH SERVICE

Director Sal Fiscina, M.D.

The Student Health Service is a general outpatient clinic designed to assist dents registered on campus with their health needs. This Service is locate 935 22nd Street, N.W. (in the H.B. Burns Memorial Building).

Physicians are present during the academic year from 9 a.m. to 5 p.m. from 6 p.m. to 10 p.m., Monday through Friday, and from 9 a.m. to 12 on Saturday. This schedule is also maintained during the Summer Sess except that the evening closing hour Monday through Friday is 9 p.m.

During hours when the Student Health Service is closed, on-campus stu may contact consulting physicians for advice connected with illness or gency by calling 223-2200 (the Medical Bureau). All callers should identify themselves as George Washington University students and ask fo physician-on-call. For serious emergencies occurring during hours when Student Health Service is closed, students may go to the Emergency Roo the University Hospital for treatment. This arrangement is for emergency only, and all fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to re treatment at the Student Health Service. A student who is not currently rolled or who has severed his connection with the University is ineligible medical benefits of the Student Health Service. Any student may engage,

desires, physicians and nurses of his own choice, but he will be responsible all the fees charged. The bills incurred from all services rendered outside of Student Health Service (for example, laboratory and X-ray work and re-als to specialists or other outside physicians) are the responsibility of the dent. Within the Student Health Service, there will be only a few small rges for some services, such as materials for an allergy injection series, over-s immunizations, and certain other services.

Any student who intends to train for an athletic team is required to pass a rough medical examination. The University is not responsible for injuries eived in intercollegiate or intramural games, or in any of the activities of Department of Physical Education, Health, and Recreation.

ALTH AND ACCIDENT INSURANCE

e Student Health Service Office has arranged for Health and Accident Insur-ce, on an elective basis, for *full-time* students registered on campus. Interested dents should contact the Student Health Service Office.

UNSELING CENTER

rector E.L. Phillips

e Counseling Center offers to students enrolled in the University services ich are designed to assist individuals in the diagnosis and treatment of their ucational, personal, and social problems; to diagnose problems leading to ademic difficulties; to offer vocational counseling and programmed instruc-n; and to refer individuals to qualified agencies for assistance with problems t handled by the Center. Behavior therapy, individual and group psycho-erapy, and individual and group counseling are available.

The Center also provides special assessments including diagnostic measures escribed by the School of Engineering and Applied Science, admissions tests r the University and for other selected educational institutions, and some lected assessments for business and industry.

Fees.—Students who are currently registered as degree candidates in the niversity are entitled to one interview without charge. If the student decides continue to use the services offered, a minimum flat fee of $30 will be arged for short-term treatment. Fees for testing and long-term treatment epend upon the services involved. All fees are payable at the Counseling enter Office.

NTERNATIONAL STUDENTS

nternational House is the campus center for students from foreign countries. serves also as the headquarters of the International Students' Society, which eks to promote international friendship and understanding by welcoming to s membership students from all countries, including those from the United tates.

The Adviser to International Students has his Office in International House nd is available each day throughout the school week for consultation on im-migration regulations and on any matters concerning the social and academic velfare of the foreign student.

STUDENT AND ALUMNI CAREER SERVICES OFFICE

Career Services Officer Gertrude McSurely
Associate Career Services Officer W.R. Stovall
Assistant Career Services Officer Carol Coy

The Student and Alumni Career Services Office provides assistance to de seeking students and alumni seeking full-time, part-time, temporary, or pe nent employment. All students are urged to become acquainted with the ser of this Office early in their college experience.

Counseling concerning trends in employment, areas of employment, va test and examination announcements, preparation for job interviews, res writing, and other procedures for successful job application are always a able. Specific career openings; an on-campus recruitment program by busi industry, government, and school systems; volunteer opportunities; and time and temporary jobs for students while attending school are all part o service. Referral and placement functions of the on-campus College Work-S Program are handled by the Student and Alumni Career Services O Teacher credential files initiated by persons seeking employment in all ed tional fields are maintained in this Office.

An understanding and knowledgeable approach to avenues of service those people who do not find career satisfaction in the structured system business, government, and education is also provided in the Student and Al Career Services Office.

RELIGIOUS LIFE

The University recognizes the contribution that religion makes to the life students and encourages them to participate in the various religious orga tions of their own choice. Catholic, Jewish, and Protestant bodies sp various groups and form a link between the University and the religious munity. The advisers of the religious organizations are available for co ing.

Religious services in various traditions are provided regularly for the versity community as announced.

STUDENT ACTIVITIES

Director of Student Activities David Speck
Activities and Orientation Coordinator John Perkins
Program Coordinator Janet Willson
Assistant to the Director Irene Cavanagh

The offices of the Vice President for Student Affairs, the Dean of Stud the Director of the Cloyd Heck Marvin Center, and the Director of Stu Activities are responsible for all co-curricular phases of student life.

STUDENT ACTIVITIES OFFICE

The Student Activities Office assists individual students and organizations program development, campus leadership training, and participation in sp

jects—both within the University community and in the community at large. s Office also serves as a central clearinghouse for development and main- ance of a master activities calendar—for registering and assisting campus anizations, for scheduling facilities (except in the Marvin Center) and events, for informing the University community of the many activities and pro- ms which can enrich the educational experience through a variety of weekly, nthly, and annual publications. The Student Activities Office is also respon- e for coordinating a comprehensive orientation program for new students ering the University. Students interested in participating in the many social, tural, or extracurricular phases of University life should acquaint themselves h the facilities and functions of the Student Activities Office and its staff.

IVERSITY COMMITTEES AND ORGANIZATIONS

e George Washington University is an active, working community where dent involvement has become a motivating force in the governance of the iversity through the committee structure. This involvement has helped elop policies and programs beneficial not only to the student population, to the total University community. While serving on these committees, dent members are able to participate in the formulation and the application ongoing institutional policy.

There are numerous committees on which members of the student body are e to serve. The Student Activities Office has a relatively complete file on jor committees, and interested students should inquire there for further ormation. Additional information is also contained in the *Student Handbook*. brief description of some of these committees follows:

Joint Committee of Faculty and Students.—This administrative committee, ated in response to a resolution of the Faculty Senate, is composed of seven ulty members, seven student members, and other ex officio members. Mem- s of this Committee are appointed by the President.

The Committee is officially charged to "facilitate all efforts to improve dent-faculty relations," to "encourage student recommendations in all areas Senate policy-formulation which affect student life," and to "recommend nges in the 'Rules and Regulations Governing the Conduct of Student e.'" The Committee has specific advisory powers in many areas concerning dent-faculty relations and the interests of the student body.

Committee on the Judicial System.—The Committee on the Judicial System omposed of three faculty members and three student members, one of whom he Chairman of the Student Court, one a student member of the Student- culty Committee on Appeals, and one selected from the campus at large. e Committee on the Judicial System works closely with the Executive cretary to the Judicial System to make sure that the various hearing bodies efficiently, fairly, and expeditiously conducting their business.

Other committees include the following: the Committee on University Park- , the Committee on Religious Life, the Committee on Sponsored Research, Committee on Student Publications, and the Committee on the University okstore.

ANDING COMMITTEES IN SCHOOLS AND COLLEGES

e schools and colleges maintain various standing committees concerned

with specific aspects of the college program; the majority are faculty mittees. One of particular interest to students, the Columbian College Adv Committee on Honors Program, includes three student representatives, erally chosen from alumni of the sophomore-year honors program. This visory Committee selects leaders for honors seminars in the College, re independent-study projects, and advises concerning the merits of these pro Invitations to Committee membership are initiated by the College.

THE STUDENT NOMINATING BOARD

This all-student board was created by the President upon the recommend of the Joint Committee of Faculty and Students in February, 1971. The was established "to make appointments to all University Committees that student members where there is no other existing means by or through orga tional charter or constitution to do so."

The members of the Student Nominating Board are the President of M Board; the President of Omicron Delta Kappa; a student member of the uate School of Arts and Sciences Advisory Council; and one represen from each of the following: Residence Hall Association, Engineers' Co Joint Committee of Faculty and Students, Student Bar Association, and ciation of Medical Students.

THE PROGRAM BOARD

The University Program Board, through its student committee structure membership, provides a variety of cultural, social, and recreational pro on campus. As a result, students are afforded opportunities to broaden educational experiences by developing and participating in those pro which contribute to the life of the University community.

Student membership on the Program Board is composed of four exe officers (Chairman, Vice Chairman, Secretary, Treasurer) elected fro general student body in the spring semester, and five committee chairme pointed after that election. The five committees of the Program Board a Public Relations Committee, Concert Committee, Arts Coordinating Comm Political Affairs Committee, and Social Committee. These students work appointed faculty members and professional staff from the Division of St Affairs in carrying out their many programs and activities.

STUDENT ORGANIZATIONS

The following is a representative list of organizations active at the Univ during 1972-73. More complete information on these and other organiza is available at the Student Activities Office.

ACADEMIC, DEPARTMENTAL, DIVISIONAL, OR SCHOOL ORGANIZATIONS

American Civilization Undergraduate Majors, Anthropology Club, Enc (debating) Society, Eta Sigma Phi (Latin and Greek fraternity), Geology German Club, Public Administration Students Organization, Russian Sigma Alpha Eta (speech and hearing fraternity), School of Public and national Affairs Advisory Board.

OR SOCIETIES

hi Beta Kappa.—A national honor society recognizing "outstanding intel-ual capacity well employed" in the field of liberal arts and sciences. Senior junior students who are candidates for the degree of Bachelor of Arts or helor of Science in Columbian College and who have shown broad cultural rests, distinguished scholarly achievement, high character, general promise, scholarly ideals may, to a number not exceeding 15 per cent of a class, be ted to membership by the Faculty members of the Alpha Chapter of the rict of Columbia. Seniors and juniors in other schools of the University meet the above requirements are also eligible for consideration for mem-hip, provided that their program of studies includes appreciable work in liberal arts.

igma Xi.—A national scientific honor society, the purpose of which is to ɔurage original investigation in science, pure and applied. Outstanding luate students in the sciences are eligible for full membership, and under-luates who have shown marked ability in research may be elected to asso-e membership.

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elphi.—An intersorority honorary society.

elta Phi Alpha.—A national German honor society.

elta Sigma Rho-Tau Kappa Alpha.—A national forensic society.

obro Slovo.—A national Slavic honor society for graduate and undergradu-students.

Mortar Board.—A national society for junior or senior college women, stress-leadership, scholarship, and service.

micron Delta Kappa.—A national fraternity for junior and senior men, hasizing leadership in extracurricular activities.

hi Eta Sigma.—A national fraternity, established to encourage and reward scholarship and attainment, membership in which is limited to those fresh-men who attain a scholastic average of at least 3.50 or the equivalent.

i Delta Phi.—A national French honor society.

i Lambda Theta.—A national honor society recognizing excellence in schol-achievement and leadership among women students in education.

i Mu Epsilon.—A national mathematics honorary.

si Chi.—A national psychology fraternity.

igma Delta Pi.—A national Spanish honor society.

ERNATIONAL AND CULTURAL EXCHANGE ORGANIZATIONS

avansary International, Indian Cultural Association, International Students' iety, Korean Students Association, Organization of Arab Students, Students rnational Meditation Society, Wah Geo Club.

FORMING ARTS

Coordinating Committee of the Program Board; Cherry Pie Film Festival; ıcert Committee of the Program Board; George Washington University ıce Company; Metatheatre Project; University Chamber Choir, Chorus, hestra; University Players. A variety of programs is presented by these ups throughout the academic year.

POLITICAL ORGANIZATIONS

GW College Young Republicans, GW Young Democrats, GWU Ripo ciety, Political Affairs Committee of the Program Board, Young America Freedom, Young Socialist Alliance.

PROFESSIONAL ORGANIZATIONS

Alpha Chi Sigma (chemistry), Alpha Kappa Psi (commerce and econo Personnel Society, Pre-Legal Society, Pre-Medical Society, Sigma Delt (journalism), Student Planning Association.

PUBLICATIONS AND COMMUNICATIONS

Academic Forum (student-faculty journal), *The Cherry Tree* (yearb *Potomac Review* (publication of Consortium graduate students), *The Creek* (literary magazine), *Student Directory, This Month* (listing of cultural events in the Washington area), *This Week* (weekly listing of sch events), *The University Hatchet* (semi-weekly newspaper), *Where to Go* (shops, stores, and services in the campus area), WRGW (University station).

RELIGIOUS ORGANIZATIONS

Baptist Student Union, B'nai B'rith Hillel Foundation, Christian Scienc ganization, Eastern Orthodox Club, Lutheran Student Association, Ne Foundation, Nichiren Sho Shu Study Academy, Religious Society of Fr Satsang, Unitarian-Universalist Club, United Christian Fellowship, W Foundation.

SERVICE ORGANIZATIONS

Circle K, Ecology Action, Freedom Shore Experience, GW Day Care Co tee, GW Medical Aid, Project Share, RAP-ID RESCUE, St. Elizabeths H tal Project, SERVE, Student Volunteer Action Council.

SOCIAL FRATERNITIES

Delta Tau Delta, Kappa Sigma, Phi Sigma Delta, Sigma Alpha Epsilon, Chi, Sigma Nu, Sigma Phi Epsilon, Tau Kappa Epsilon.

SOCIAL SORORITIES

Delta Gamma, Kappa Alpha Theta, Kappa Kappa Gamma. A Panhe Council includes representatives of all sorority chapters at the University.

SPECIAL INTEREST AND ADVOCATE GROUPS

Black People's Union; Campus Association for Principled Education; Co sion on Model Government; D.C. Public Interest Research Group, GW Ch Freedom Leadership Foundation; Gay People's Alliance; GW Alpha- Club; GW Labor Committee; Jewish Activist Front; Open Committee f

Jniversity Government; People's Union; Scientists and Engineers for Politi-
Action; Student/Faculty Union for an Open University; Student Mobiliza-
Committee to End the War; Women's Liberation.

RTS, HOBBIES, RECREATIONAL ORGANIZATIONS

nda Marga Yoga Society, Bridge Club, Cheerleaders, Folkdance, GW Ama-
Radio Club, GWU Chapter of Yoga Institute of Washington, GWU Grotto,
U Parachute Club, GWU Rugby Club, Ski Club.

ATHLETICS AND INTRAMURAL SPORTS

University is a member of the National Collegiate Athletic Association
the Eastern College Athletic Conference. Its teams participate against
r universities throughout the Midwest and Eastern Seaboard. The inter-
giate program is comprised of basketball, baseball, soccer, tennis, golf,
tling, rifle, crew, and cross country.
he University offers a broad program of intramural sports activities for
men and women through the Department of Physical Education, Health,
Recreation.

MAJOR PROGRAM EVENTS

rt Exhibits.—The work of locally, nationally, and internationally known
ts is shown in monthly exhibits in the Dimock Gallery in Lisner Lounge
in the art gallery of the Cloyd Heck Marvin Center. With the cooperation
he Curator of Art, an annual student art exhibit is presented.
oncert Series.—The Department of Music presents an artist concert series
ive concerts each year.
rchestra and Chorus Concert Series.—The University Orchestra and Chorus
two facets of the lively arts available to students either as credit courses or
extracurricular activities. The Chorus presents major performances to the
iversity community four or five times a year, including regular Christmas and
ng concerts. The University Orchestra presents four or five concerts a year.
rogram Board Series.—The University Program Board sponsors concerts
h semester at which nationally known entertainers perform.
ecreation Program.—The University Recreation Association and the De-
tment of Physical Education, Health, and Recreation arrange a wide variety
sports and recreational activities and special events for all students.
heatre.—The Drama Department produces seven major plays during the
r on the new proscenium/thrust stage in the Dorothy Betts Marvin Theatre
in Lisner Auditorium. Several original and experimental plays are pro-
ed in the Experimental Theatre. Students have the opportunity to participate
all aspects of theatre and may receive credit toward their B.A. or M.F.A.
grees for some of their production work.

COLUMBIAN COLLEGE OF ARTS AND SCIENCES

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Assistant Deans Barbara Dunham, J.L. Métivier, Jr., R.C. Rutledge, H.E. Yeide, Jr.

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* The President of the University, the Vice President for Academic Affairs, the Registrar University, the Director of Admissions of the University, and the University Librarian are e members of the Faculty of Columbian College of Arts and Sciences.

ber, Dagmar Henney, C.J. Herber, P.P. Hill, Mary Holman, R.L. Humrey, Jr., C.T. Ireland, S.G. James, Eva Johnson, W.R. Johnson, S.A. Karp, ing Katz, Young Kim, Virginia Kirkbride, Ruth Krulfeld, Myrna Lee, tricia Lengermann, J.F. Lewis, C.A. Linden, R.C. Lindholm, J.M. Logsdon, F.E. Long, J.C. Lowe, W.L. Marsh, Muriel McClanahan, J.A. Morgan, Jr., A. Moser, Nadine Natov, G.A. Olkhovsky, Robert Parris, C.H. Pfuntner, . Quitslund, Bernard Reich, W.M. Reynolds, Charles Rice, Philip Robbins, W. Rowe, D.A. Rowley, R.C. Rutledge, Pilar Sáenz, S.O. Schiff, Lois hwoerer, D.E. Silber, W.A. Smith, Carl Steiner, R.H. Tanck (*Research*), H. Teller, Klaus Thoenelt, Irene Thompson, Richard Thornton, N.A. lkens, W.L. Turner, C.E. Tuthill, Dewey Wallace, Jr., S.J. Wayne, R.C. illson, Lawrence Winkler, R.Y.C. Yin, J.E. Ziolkowski

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* Dean of Columbian College of Arts and Sciences is an ex officio member of all committees.
cted by the Faculty to serve through the designated year.

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* Elected by the Faculty.
† This Council serves both Columbian College of Arts and Sciences and the Graduate Scho
and Sciences. The President of the University, the Vice President for Academic Affairs, th
Columbian College of Arts and Sciences, and the Dean of the Graduate School of Arts an
are ex officio members of the Council.

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INTRODUCTION

its founding in 1821, Columbian College of Arts and Sciences, the liberal college of the University, has continued to expand and develop with the of Washington. Its central situation makes participation in the life of the n's capital convenient for resident students. The cosmopolitan nature of tudent body reflects the atmosphere of a great world capital. Because the nts come from the fifty states and from ninety foreign countries, class dis-ons and casual student conversations are enriched by a challenging vari-f viewpoints.

roughout its history, the College has kept pace with, and often led, move-ts of reform in higher education. Sensitive to the rapidly changing patterns udent and social needs, notably the increasing maturity and knowledge of modern incoming freshman, the College in 1971 inaugurated sweeping ges in its academic programs. In brief summary, the changes are designed 1) permit the able student to earn his baccalaureate degree in less than standard four years, either by earning credit through a wide variety of ninations or by performing with excellence within a 90-semester-hour three- program; (2) provide each student with a greater opportunity to design own academic program by eliminating almost all specific course require-ts except in the major field; (3) encourage an early and close association een the student and individual faculty members in the field of the student's f interest; and (4) foster a spirit of community and shared responsibility een faculty and student.

pportunities exist for double majors; interdisciplinary programs; and, in case of the student who finds no existing major or program suitable to his ational goals, special interdisciplinary programs which may be developed he student, in consultation with departmental advisers and with the final oval of the Committee on Programs.

olumbian College offers programs leading to the degrees of Associate in , Bachelor of Arts, Bachelor of Science, and Bachelor of Science in Medical

Technology; prelegal and premedical programs; the first two years
professional programs in Education and in Public and International Affa

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Columbian College has degree-granting authority over the off-campus pro
leading to the degrees of Associate in Arts in General Studies, Bache
General Studies (areas of concentration in history, mathematics, p
science, and psychology), Bachelor of Science in Environmental Health,
lor of Science in Geodetic and Cartographic Science (areas of concen
in cartography and geodesy), and Bachelor of Science in Oceanography.

These off-campus degree programs are administered by the College o
eral Studies. For further information see the *College of General Studie*
logue.

THE COLUMBIAN COLLEGE PROGRAM

The Columbian College program is a contemporary application of the l
liberal arts tradition. Its purpose is to enable the student to develop b
particular abilities and his general awareness as a human being. It dema
the student a thorough acquaintance with one major area of learning
the same time an understanding of how that specialization fits into the
context of the scientific, social, and moral problems which confront m
man. It stresses not merely expertness but that broadly enlightened exp
which encourages its graduates to grow through the years in ability and w

SOPHOMORE YEAR IN PARIS PROGRAM

Freshmen who have received grades of *C* or higher in all course wor
ing the first semester may be eligible to participate in the George Wash
University-American College in Paris Sophomore Year in Paris Pr
Qualified students will be encouraged to accept this opportunity to profi
the cultural and intellectual riches of Europe by spending their secon
living and studying in Paris. Credits earned in this Program will be tr
rable toward a degree in Columbian College of Arts and Sciences. Si
courses are taught in English, a knowledge of French is not mandatory
desirable.

ENTRANCE REQUIREMENTS

Good character and an academic background appropriate for the prog
studies contemplated are required.

Requirements for admission to the freshman class are as follows:

1. An acceptable certificate of graduation from an accredited sec
school, showing at least fifteen units* which must include four years of E
at least two years of one foreign language; two years of science, pre
with laboratory instruction; two years of social studies, one of which
American history; and two years of college preparatory mathematics.

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* A unit represents a year's study in a secondary school subject, including in the aggregate
than 120 sixty-minute periods, or the equivalent, of prepared classroom work.

gebra, or the equivalent, is prerequisite to courses in chemistry and sta-
; and one unit in algebra and one unit in plane geometry, or the equiva-
are prerequisite to courses in mathematics and physics.
The principal's statement that the applicant is prepared to undertake col-
work.
College Entrance Examination Board scores submitted on the Scholastic
ude Test and the English Composition Achievement Test.
is recommended that the examinations be taken in December or January.
s on tests taken in the junior year may be submitted. Arrangements for
are the responsibility of the applicant and should be made with the Edu-
nal Testing Service, 20 Nassau Street, Princeton, N.J. 08540; or 1947
er Street, Berkeley, Calif. 94704, not less than one month before the date
e test. In applying for the test, the applicant should specify that the scores
nt to the Office of Admissions, George Washington University, Washing-
D.C. 20006.
ie College Entrance Examination Board tests are preferred; however, the
rican College Testing battery scores will be accepted. The applicant should
est that these scores be sent to the Office of Admissions directly from the
rican College Testing Program, Iowa City, Iowa. It is recommended that
pplicant take the tests in October of the senior year.
ie Committee on Admission and Advanced Standing will consider the ade-
y of the qualifications of an applicant who, because of unusual circum-
es, does not present all of the formal requirements stated above. The
mittee may prescribe appropriate scholastic-aptitude tests of the University.

REGULATIONS

ulations regarding ADMISSION, REGISTRATION, FEES AND FINANCES *are*
d on pages 21-33; other University regulations, on pages 43-51.

DEMIC WORK LOAD

encourage academic performance of high quality, the student's work load
mited.
full-time student not on probation may take a course load of as much as
semester hours. A student employed more than 20 hours a week who is
on probation may take not more than 10 hours.
he amount of work taken by a student on probation may be limited by the
mmittee on Scholarship.
A full-time student who, during the immediately preceding semester, has
ived no grades below *B* and has earned grades of *A* in three courses totaling
east 9 semester hours may take 18 or 19 hours. An employed student who,
ing the immediately preceding semester, has received no grades below *B*
has earned grades of *A* in two courses totaling at least 6 semester hours
y take 12 hours.
A student who accepts employment after registration or at any time during
emester must report that fact immediately to the Dean so that his program
y be adjusted, if necessary.

ATTENDANCE

The student is held responsible for all the work of the course in which registered, and all absences must be excused by the instructor in charge provision is made for the student to make up work missed.

USE OF CORRECT ENGLISH

The use of correct English, oral and written, is required in all courses. student whose English in any course whatever is deemed unsatisfactory m reported by the instructor to the Dean and to the Committee on the U Correct English. The Chairman of the Committee may assign supplem work, without academic credit, varying in amount with the needs of th dent. If the work prescribed is equivalent to a course, the regular tuitio is charged. The granting of a degree may be delayed by failure to ma any such deficiency in English to the satisfaction of the Committee an Dean.

HONORS

Sophomore Honors Program.—Columbian College offers an honors pr for selected sophomores. The program is designed to provide an appro challenge and opportunity for gifted students; to permit early identificat students with the highest potential for high-quality graduate work and s in competitive award programs; to introduce educational innovations may possibly be applied at a later date to the student body at large; to together a group of students whose activities will enable them to cont more significantly to academic discussion within the University as a and to involve superior students in a program unmistakably identified wit liberal arts ideal of the generally educated man, thus balancing the empha concentrated study that is the heart of existing departmental honors prog

The program normally consists of 2 honors seminars (see page 326), limited to approximately 15 students. Each seminar carries 3 semester of credit, and represents elective hours in the student's program. Directo the seminars invite expert faculty members from different fields to ass discussion of particular problems. Students may elect a program of inde ent study in place of the second seminar.

Participants in the Honors Program are selected at the end of their firs on the basis of an application to the program. All students who earn four or *B* or better in their first semester are automatically eligible to apply. students doing high-quality work may apply on the recommendation of their instructors.

A student will have the designation "sophomore honors" entered in permanent record if he (1) completes successfully 2 semesters of honors and (2) earns grades of *B* or better in 16 courses during his first two ye study.

Dean's List.—The name of every student who takes a minimum of 15 s ter hours in any one semester, who receives grades of *A* in at least 6 cent of the course work taken in that semester, and who has no grades be for that semester, is placed on the Dean's List for that semester.

ADEMIC STANDING

student who is not suspended or on probation is considered to be in good nding.

The following rules governing probation and suspension are applicable as ted to students enrolled for a full-time program (12 semester hours or more) ring the fall or spring semester. Students enrolled for less than 12 semester urs during the fall or spring semester and students enrolled during the sum-er sessions are subject to probation or suspension on the basis of their record r four courses (3 or more semester hours of credit each), or multiples thereof, ther than on their record in any one semester.

OBATION

student who in one semester receives two grades of *F* in courses carrying or more semester hours of credit each, or the equivalent, is placed on proba-on. A student in his first semester on probation who receives one grade of *F* such a course will be continued on probation for a second semester. Two ades of *D* will be treated as equivalent to one grade of *F* in determining pro-ation. Any grades of *D* or *F* replacing earlier grades of *I* will be considered a rt of the record for the semester during which the *I* is removed. A student on obation taking 12 or more semester hours whose grades are all *C* or better is moved from probation.

SPENSION

student who in one semester receives grades of *F* in three courses carrying or more semester hours of credit each, or the equivalent, is suspended. A dent in his first semester on probation who receives two or more grades of in such courses is suspended. A student who receives one or more grades *F* in such courses in any later semester on probation is suspended. Two ades of *D* will be treated as equivalent to one grade of *F* in determining sus-nsion. Any grades of *D* or *F* replacing earlier grades of *I* will be considered a rt of the record for the semester during which the *I* is removed.

The minimum period of academic suspension is one fall or one spring se-ester. Final dates for applying for readmission are the same as those gov-ning "Undergraduate Admission" (see pages 21-24). A suspended student eking readmission must submit evidence to the Committee on Admission d Advanced Standing that during his absence from the University he has so nducted himself as to indicate that he will profit by readmission. A student spended twice for poor scholarship will not be readmitted.

D-SEMESTER WARNING

hen, at the end of the sixth week of each semester, instructors file in the Office the Dean the names of freshman and sophomore students who are doing satisfactory work, a notice of Warning is sent to the student and a copy ed with the appropriate adviser. A "Warning" constitutes notice to the stu-nt that he should consult his instructor and adviser at the earliest opportunity.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized W drawal) may be assigned are described on page 44.

Removing an Incomplete.—The grade of *I* must be removed no later tha last day of the examination period for the fall or spring semester immedi following the semester or summer session in which the grade of *I* is assig An "Incomplete" that is not removed within this period is automatically cha to an *F*. In cases of well-documented extenuating circumstances, an instru and a student may jointly petition the Dean, or the appropriate committee additional time in which to complete the work of the course. Such peti should be submitted within the same period. The grade of *I* cannot be rem by reregistering for the course here, or by taking its equivalent elsewhere.

CORRESPONDENCE AND HOME-STUDY COURSES

No credit is given for work done by correspondence or in home-study cou

CLASSIFICATION OF STUDENTS

A *freshman* is a student who has completed less than 30 semester h A student becomes a *sophomore* when he completes 30 semester hours. A dent becomes a *junior* when he completes 60 semester hours. A student bec a *senior* when he completes 90 semester hours.

An *unclassified student* is one who is not a candidate for a Bachelor's d (normally because he already holds one), but who wishes for valid acad reasons to take a limited program for a limited time. Registration in this s is permitted only with the prior approval of the appropriate Dean's Cou

THE FRESHMAN YEAR

A freshman is given the opportunity of taking a wide range of liberal subjects—Humanities, Natural and Mathematical Sciences, Social Studi both as a means of laying the groundwork for his more concentrated major study and as a means of determining what academic area is best adapte his interests and aptitudes.

ADVISORY SYSTEM

Each freshman is provided with two kinds of counseling. *Academic* advisi performed by members of the Faculty selected for their knowledge of acad programs, and each student makes up his program in consultation with adviser assigned to him before registration. A student who has selected major field receives his academic advising from the appropriate departmen from an interdepartmental committee. See also "Academic Advising Cent pages 75-76. *Personal* counseling is available through the Office of the Dea Students. All students are encouraged to maintain close contact with advisers.

Students who intend to transfer after the sophomore year to the Scho

cation or the School of Public and International Affairs are assigned ial advisers to assist them in planning their programs.

n academic warning system permits early attention to students whose work below required standards. In such cases, students are asked to consult larly with their advisers. On request, copies of academic warnings or pro-on notices may be sent to parents or guardians, who are themselves wel-e to meet with members of the advisory staff.

QUIRED PLACEMENT EXAMINATIONS

nglish.—Students whose College Board English Composition Achievement t scores suggest inadequate preparation may be assigned to Engl 1*x* or be tested in vocabulary, spelling, grammar, standard usage, and writing l before placement in either Engl 1*x* or 1. Students whose scores indicate rked superiority will be allowed to waive the Engl 1 requirement.

oreign Languages.—A student who has not been granted advanced standing who wishes to continue in college the language begun in high school must e a placement examination in one of the following: Chinese, French, Ger-n, Greek, Hebrew, Italian, Latin, Russian, or Spanish. Upon completion of examination, assignment is made to the appropriate course.

Mathematics.—New students accepted for registration in Math 30 are re-red, prior to registration, to take a placement examination in algebra and gonometry.

COND-GROUP COURSES

qualified freshman or sophomore may, with the permission of the department ncerned, take second-group courses (courses numbered 101-200).

OFESSIONAL COURSES

cept for majors in Applied Mathematics and for students intending to apply the combined degrees of Bachelor of Arts and Doctor of Medicine or the gree of Bachelor of Science in Medical Technology, no more than 12 hours professional courses, e.g., courses offered in units of the University other an Columbian College, may be included in the hours required for the Bache-'s degrees in Columbian College. Students electing professional courses der this rule must obtain the approval of the Dean before registration.

PERIMENTAL HUMANITIES/SERVICE-LEARNING PROGRAM

maximum of 21 semester hours in any combination of Experimental Hu-anities courses and Service-Learning Program courses may be credited to-ard Bachelor's degrees in Columbian College.

OREIGN LANGUAGE REQUIREMENT

major programs requiring foreign languages a student must complete satis-ctorily the equivalent of two years of college work in a single foreign nguage.

A student offering for admission four acceptable high school units of a

single foreign language, or the equivalent, is not required to take any fo
language.

A student who offers less than four units and wishes to continue the
language must take the language placement test.

In many instances foreign languages are required or recommend
preparation for advanced work. The student should consult his adviser s
appropriate foreign languages may be included, when necessary, in his pro

EARNING CREDIT OR WAIVING REQUIREMENTS BY EXAMINATION

A student may earn semester-hour credits up to a maximum of 30 hou
waive curricular requirements without limitation, by performing satisfac
on any or all of the following tests: Advanced Placement Tests (see
23), Achievement Tests (may be used to waive requirements only), Co
Level Examination Program, Special Examinations—provided by the d
ments of Columbian College of Arts and Sciences on an individual basis. *P*
a waiver examination does not entitle the student to any semester hours of

Achievement Tests.—See page 24.

College-Level Examination Program (CLEP).—CLEP offers two typ
examinations:

CLEP Subject Examinations—offered in 29 subject areas. These tests
ure achievement in the equivalent of specific college-level courses. (Du
credit—by passing the examination and by passing the equivalent cour
not permissible.)

CLEP General Examinations—offered in five areas: Mathematics,
Sciences, Humanities, the Natural Sciences, and English Composition. (Cr
advanced standing—is not given for the General Test in English Compos
To be eligible to take the CLEP General Examinations, a student mus
been out of school for three years or more.

Special Examinations Offered by Departments.—A student may reque
department of Columbian College to offer him a special examination co
the subject matter of any specific course. (If an appropriate CLEP S
Examination is available, the department may choose to employ it.) If
dent performs satisfactorily, he may receive credit (advanced standing),
of a requirement, *or both,* at the discretion of the department. Special
mental examinations will normally be of at least three hours' duration.
of $25 for each course examination is charged for preparing, adminis
and grading.

DECLARATION OF MAJOR

The student is encouraged to select his major field early, normally no late
the end of the freshman year. He should obtain the appropriate form
Office of the Dean and the approval of his major department. Thereaft
receives academic guidance from a faculty adviser in his major-field depar

COLUMBIAN COLLEGE GENERAL COURSE REQUIREMENTS

All candidates for the degree of Bachelor of Arts or Bachelor of Scien
admitted to a general arts and sciences curriculum until they choose a
field. Except for two general course requirements, all curriculum requir

ing to the degrees of Bachelor of Arts and Bachelor of Science are estab-
d by the various major field departments or programs.
he two general requirements are the following:
Each student must, during his freshman year, demonstrate adequate
evement in the field of English Composition, either by examination or by
ng Engl 1 or 1*x*, and Engl 2 or 4.
Each student at some point in his college career must undertake a "mean-
ul initiation" into the three divisions of knowledge: Humanities, Natural
Mathematical Sciences, and Social Studies. As each major field will
nally represent one of these three areas, the requirement may be fulfilled
aking no less than 6 semester hours in each of the other two areas. These
redits may be in approved introductory courses, or in approved advanced
rses if the student is qualified and receives the instructor's permission.
rmally, these 6-hour units should be taken in a single subject or department.
umbian College departments and programs are listed below under the three
gories.

Humanities	*Natural and Mathematical Sciences*	*Social Studies*
Art		American Civilization
Classics	Biological Sciences	Anthropology
East Asian Languages and Literatures	Chemistry	Economics
English	Geology	Geography and Regional Science
Germanic Languages and Literatures	Mathematics	History
Music	Physics	Journalism
Philosophy	Statistics	Political Science
Religion		Psychology
Romance Languages and Literature		Sociology
Slavic Languages and Literatures		
Speech and Drama		

ASSOCIATE IN ARTS DEGREE

e Associate in Arts degree may be granted to a student who has completed
semester hours in arts and sciences with acceptable grades, and who has
filled the general requirements described above. In addition, the degree may
awarded to Pre-Education, Pre-Public and International Affairs, and Pre-
edical Technology students upon completion of the curriculum specified for
first two years of the appropriate program. The last 15 semester hours of
program of study must be completed in residence in Columbian College.
student wishing to receive this degree must file an "Application for Gradua-
n" form and pay the $10 graduation fee at the time of registration for the
nester or summer session in which he will complete his requirements.

ACADEMIC ADVISING CENTERS

ch Department has set up Academic Advising Centers where both general
ucational counseling and specific major-field advising is available to students.

The locations and hours of these Centers may be obtained from departm offices or from the Office of Columbian College.

As the freshman student deliberates his choice of a major, he should c with faculty advisers in as many of these Centers as he wishes. Once a is selected, the student then receives all of his academic counseling fro Advising Center of his major department. To declare his major, the st should secure the proper form from the Office of Columbian College, t to his Academic Advising Center, secure the signature of his adviser, return the form to the Office of Columbian College. No student is consi to have a major until this process is completed.

PREPROFESSIONAL REQUIREMENTS

PREMEDICAL CURRICULUM

A premedical student who intends to work toward a Bachelor's degree the two general requirements of Columbian College (see pages 74-75), a may follow the major field curricula of any Columbian College depart Each premedical program must be approved by the premedical adviser. admission to most medical schools the student must have a minimum semester hours applicable towards a degree in an approved college o and sciences, and the 90 hours must include

1. **Biology:** 8 semester hours. This may be either in general biology or z but may *not* include separately credited courses in botany.
2. **Chemistry:** 8 semester hours of general inorganic chemistry (which m clude qualitative analysis), including 4 semester hours of laboratory; and semester hours of organic chemistry, including laboratory.
3. **Physics:** 8 semester hours, including at least 2 semester hours of labo
4. **English:** 6 semester hours. This may be the usual introductory college or its equivalent.

While not required for admission, courses in biochemistry, embryology, his genetics, and mathematics are strongly recommended.

With the exception of these specific requirements applicants are ur follow their personal interests in developing their premedical courses of A well-balanced program, rather than a specific field, is the criterion by an applicant is judged. It is not advisable to take courses that appear to subject matter in the medical program.

While well-qualified candidates are eligible for admission after com the minimum 90 semester-hour requirement, the majority of applican found to be better prepared for the study of medicine after four ye college work.

MEDICAL TECHNOLOGY

Beginning with the academic year 1973-74, the Medical Technology curr will be extensively revised. All entering freshmen seeking this degree required to follow the new curriculum (Medical Technology II). Some t students and students registered in the Bachelor of Science in Medical nology degree program prior to September, 1973, will follow the progr study under the old curriculum (Medical Technology Curriculum I).

ICAL TECHNOLOGY CURRICULUM I

two years of the Bachelor of Science in Medical Technology curriculum. page 87 for a description of the program and the requirements for the r and senior years:

		Semester Hours
Engl:	Engl 1 or 1*x*, and 2 or 4	6
Humanities:	Six semester hours selected from one of the following combinations: Art 31–32; Art 71–72; Engl 51–52; Engl 71–72; Engl 91–92; Mus 3 and 4; Rel 9 and 10; or Rel 59–60	6
Math:	Math 3, 6	6
	NOTE: the Math 3 requirement may be satisfied by offering two years of high school algebra acceptable for admission; the Math 6 requirement may be satisfied by offering one-half year of high school trigonometry acceptable for admission.	
Science:	B Sc 11–12, 111	12
	Chem 11–12, 22	12
ocial Studies:	Six semester hours selected from one of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40; Hist 71–72; P Sc 4 and 6; P Sc 5 and 6; or Soc 1 and 2	6
Elective:	Courses other than science	12
	Total	60

DICAL TECHNOLOGY CURRICULUM II

lents entering in September 1973 and thereafter will follow the first two-year iculum below. For some students this will be a terminal program of study ing to the degree of Associate in Science (Medical Laboratory Techniques). first year of study will be in an arts and science program in Columbian ege; the second-year students will spend a 12-month period, beginning in , in the Medical Technology program, in the School of Medicine and Veterans Administration Hospital of Washington, D.C. Students should e application by March 15 of the freshman year to take the 12-month nd-year program. For further information, call 331-6640. Students com-ing this two-year curriculum will be eligible for the certifying examination Medical Laboratory Technicians given by the Board of Registry of the erican Society of Clinical Pathologists. Stipends are provided by the Vet-ns Administration Hospital for students enrolled in the last ten months of the nd year.

tudents who wish to continue for the degree of Bachelor of Science in dical Technology should refer to the description of the new program and the uirements for the junior and senior years on pages 87-88.

	First Year	Semester Hours
Engl:	Engl 1 or 1*x*, and 2 or 4	6
Math:	Math 3, 6	6
	NOTE: the Math 3 requirement may be satisfied by offering two years of high school algebra acceptable for admission; the Math 6	

		Sem. Hr.
	requirement may be satisfied by offering one-half year of high school trigonometry acceptable for admission.	
Science:	B Sc 11–12	
	Chem 11–12	
Elective:		

12-month Second Year

Path 1:	(July-August at the School of Medicine)	
Path:	Path 11, 21, 31, and 41 (September-June at Veterans Administration Hospital, Washington, D. C.	
	Total semester hours	

EDUCATION CURRICULUM

First two years in preparation for the Bachelor of Arts in Education degree the School of Education:

		Sem. Hr.
Engl:	Composition—Engl 1 or 1*x*, 2	
	Literature—Engl 51–52, 71–72, or 91–92	
Math:	Two semesters to supplement senior high school courses, chosen from Math 3, 6, 9, and 10	
*PE:	Any combination of first-group Physical Education, Health, and Recreation courses	
Psyc:	Psyc 22	
	Psyc 29 (for elementary majors) or 112 (for secondary majors)	
Science:	Three semesters (2 in biological science and one in physical science or vice versa) to supplement senior high school courses in those fields, chosen from B Sc 3–4 or 11–12; Chem 3–4 or 11–12; Geol 1–2; or Phys 1 and 2, or 9–10. A secondary education major offering for admission 2 or more acceptable senior high school units in the above areas of science may be exempted from one semester of this requirement	
Social Studies:	Hist 71–72, or P Sc 4 and 6 or 5 and 6	
	Six semester hours selected from one of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40; Hist 71–72; P Sc 4 and 6; P Sc 5 and 6; or Soc 1 and 2	
Sp&D:	Sp&D 1 (or 11, if the Department so advises)	
Elective:		
	Total	

* Freshmen and sophomores are required to take physical education unless they are registered for more than 9 semester hours or unless regular employment during the day makes it necessary to take classes during the evening hours. Any other exemption will be granted only upon written proof which has been recommended by the University Phsyician and approved by the Dean. Students exempted from the physical education requirement must substitute an equivalent number of semester hours of electives.

SICAL EDUCATION CURRICULUM

t two years in preparation for the Bachelor of Science in Physical Education ree with Specialization in Elementary or Secondary Physical Education in School of Education:

		Semester Hours
Engl:	Engl 1 or 1x, 2	6
PE:	Any combination of first-group Physical Education, Health, and Recreation courses*	4
	PE 103	3
Psyc:	Psyc 22	3
	Psyc 29 (for elementary majors) or 112 (for secondary majors)	3
Math/Science:	B Sc 3–4; Chem 3–4; Geol 1–2; Math 9 and 10; or Phys 1 and 2, or 9–10	6–8
Social Studies:	Twelve semester hours selected from any two of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Hist 39–40; Hist 71–72; P Sc 4 and 6; P Sc 5 and 6; Soc 1 and 2	12
Sp&D:	Sp&D 1 (or 11, if recommended by the Department)	3
Elective:		24
	Total	64–66

st two years in preparation for the Bachelor of Science in Physical Education gree with Specialization in Dance in the School of Education:

		Semester Hours
Engl:	Engl 1 or 1x, 2	6
PE:	Any combination of first-group courses in Dance and/or PE 121 and 123*	4
	PE 103, 107, 108, 157	9
Psyc:	Psyc 22, 112	6
Math/Science:	B Sc 3–4; Chem 3–4; Geol 1–2; Math 9 and 10; or Phys 1 and 2, or 9–10	6–8
Social Studies:	Twelve semester hours selected from any two of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Hist 39–40; Hist 71–72; P Sc 4 and 6; P Sc 5 and 6; Soc 1 and 2	12
Sp&D:	Sp&D 1 (or 11, if recommended by the Department)	3
Elective:		18
	Total	64–66

HINESE LANGUAGE AND LITERATURE†

he first two years in preparation for the Bachelor of Arts degree with a major Chinese Language and Literature in the School of Public and International

Freshmen and sophomores are required to take first-group physical education activities courses (or ecified second-group alternative courses) unless they are registered for less than 9 semester hours or less regular employment during the day makes it necessary to take all classes during the evening urs. Any other exemption will be granted only upon written petition which has been recommended the University Physician and approved by the Dean. Students exempted from this requirement ust substitute an equivalent number of semester hours of electives.

†The degree of Bachelor of Arts with a field-of-study major in Chinese Language and Literature is so available in Columbian College of Arts and Sciences (see page 256).

Affairs consists of a minimum of 60 semester hours. Each student m during his freshman year, demonstrate adequate achievement in the field English Composition, either by examination or by taking Engl 1 or 1*x*, Engl 2 or 4. Either while in Columbian College or the School of Public International Affairs, he must also undertake a "meaningful initiation" into three divisions of knowledge: Humanities, Natural and Mathematical Scien and Social Studies. As the major field represents one of these three areas, requirement may be fulfilled by taking no less than 6 semester hours of proved introductory courses, or 6 semester hours in approved advan courses if the student is qualified and receives the instructor's permission the Natural and Mathematical Sciences and in Social Studies. Students m include in their program of study Asia 1-2, 3-4, and 9; Asia 7-8 and 9; or A 5-6. Asia 5-6 is preferred.

CHINESE STUDIES OR INTERNATIONAL AFFAIRS CURRICULUM

First two years in preparation for the Bachelor of Arts degree in the field Chinese Studies or International Affairs in the School of Public and In national Affairs:

		Sem Ho
Engl:	Engl 1 or 1*x*, and 2 or 4	
Humanities or AmCv:	Art 31–32 or 71–72; *Literature (American, Chinese, East Asian, English, French, German, Greek and Latin, Italian, Slavic, or Spanish); Mus 3, 4; first- or second-group Philosophy courses; Rel 21, 59–60; or AmCv 71–72	
†Language:	Chinese, French, German, Hebrew, Italian, Russian, or Spanish	12
Math/Science:	B Sc 3–4 or 11–12; Geol 1–2; Math 9 and 10 or 30 and 31; Phys 1 and 2 or 9–10; or one course selected from Stat 51, 53, 91, and one course selected from Stat 97, 105, 111	
Social Studies:	Econ 1–2; Hist 72, and either Hist 40 or 92; P Sc 4 and 6 or 5 and 6	
‡Elective:		6
	Total	

PUBLIC AFFAIRS CURRICULUM

First two years in preparation for the Bachelor of Arts degree in the field Public Affairs in the School of Public and International Affairs:

		Sem Ho
Engl:	Engl 1 or 1*x*, and 2 or 4	
Humanities or AmCv:	Art 31–32 or 71–72; *Literature (American, Chinese,	

* If a student elects 6 semester hours of literature in any foreign language, this cannot be to satisfy the language requirement.
† Asia 5-6 is required for Chinese Studies majors. Greek and Latin not acceptable for Interna Affairs majors.
‡ Credit is not given for courses elected in Physical Education, Health, and Recreation.

		Semester Hours
	East Asian, English, French, German, Greek and Latin, Italian, Slavic, or Spanish); Mus 3, 4; first- or second-group Philosophy courses; Rel 21, 59–60; or AmCv 71–72	6
Language or Statistics:		12
	NOTE: this requirement may be satisfied by 2 years of one foreign language* or 12 semester hours of Statistics. Statistics courses taken to fulfill this requirement may not also satisfy the Math/Science requirement below.	
Math/Science:	B Sc 3–4 or 11–12; Geol 1–2; Math 9 and 10 or 30 and 31; Phys 1 and 2 or 9–10; or one course selected from Stat 51, 53, 91, and one course selected from Stat 97, 105, 111	6–8
Social Studies:	Econ 1–2; Hist 40 or 92, and 71–72; P Sc 4 and 6 or 5 and 6	21
†Elective:		7–9
	Total	60

URBAN AFFAIRS CURRICULUM

First two years in preparation for the Bachelor of Arts degree in the field of Urban Affairs in the School of Public and International Affairs:

		Semester Hours
Engl:	Engl 1 or 1*x*, and 2 or 4	6
Humanities or AmCv:	Art 31–32 or 71–72; Literature (American, Chinese, East Asian, English, French, German, Greek and Latin, Italian, Slavic, or Spanish); Mus 3, 4; first- or second-group Philosophy courses; Rel 21, 59–60; or AmCv 71–72	6
Math/Science:	B Sc 3–4 or 11–12; Chem 3–4 or 11–12; Geol 1–2; Math 9 and 10 or 30 and 31; Phys 1 and 2 or 9–10	6–8
	NOTE: If a student elects two years of a foreign language, he may substitute two semesters of Statistics courses for the Math/Science requirement.	
Social Studies:	Econ 1–2, Hist 71–72, and P Sc 4 and 6 or 5 and 6	18
	Six semester hours selected from the following: Hum 40, 51–52, Soc 2	6
†Elective:	Students may substitute some of the required courses for the major (see page 170) for elective courses during the sophomore year	16–18
	Total	60

* Greek and Latin not acceptable for Public Affairs majors.
† Credit is not given for courses elected in Physical Education, Health, and Recreation.

THE BACHELOR'S DEGREES

Columbian College offers programs leading to the degrees of Bachelor of A Bachelor of Science, and Bachelor of Science in Medical Technology.

In cooperation with the School of Medicine a seven-year curriculum lea to the combined degrees of Bachelor of Arts and Doctor of Medicine is offe

REQUIREMENTS FOR THE DEGREES

RESIDENCE

For the Standard 120-semester-hour Program.—A minimum of 30 seme hours, including at least 12 hours in the major field, must be completed residence in Columbian College. *Unless special permission is granted by Dean to pursue work elsewhere, the work of the senior year must be compl in residence.* This requirement applies to students transferring within the U versity as well as to students transferring from other institutions.

For the 90-semester-hour Program.—The last 60 semester hours, includ at least 12 hours in the major field, must be completed in residence in Col bian College.

Summer work may be counted in residence. For regulations governing stude who are absent from the University for one semester or more, see "Continu Registration," page 47.

CURRICULUM REQUIREMENTS

A change in degree candidacy within Columbian College (e.g., from Bache of Arts to Bachelor of Science) requires the permission of the Dean. T degree requirements effective at the time the change is approved must be m

First-group courses may be required as prerequisites to the major, b because of their introductory character they cannot be counted as part of su programs. (See "Explanation of Course Numbers," pages 194-95).

CREDIT/NO CREDIT OPTION

A junior or senior student in Columbian College who is in good standing ma with the approval of his adviser and the Dean, take one course a semester a receive a grade of *CR*, Credit, or *NC*, No Credit. No student will be allowed take more than four credit/no credit courses under this regulation. He ma however, in addition receive grades of *CR/NC* in the proseminar for field-s study majors and in other courses normally using such grades. A student mu sign up for the credit/no credit option at registration. Under no circumstanc may a student change from credit/no credit status to graded status, or vi versa, after the end of registration. Courses required in the student's maj field (courses required in the major department or those required outside th major department) may not be taken on the credit/no credit basis. A transf student may not choose this option until the second semester of his enrollme in this University.

TORIAL STUDY

junior or senior of demonstrated capacity, with a special interest in the bject matter of a *regularly listed course,* may be permitted to take tutorial udy *in residence* under the personal direction of the instructor, in accordance ith the rules of the appropriate department and with the approval of the ean. Credit under this plan is limited to the specific semester hours of credit esignated for each course in the list of courses of instruction. It assumes equent and regular conferences between the student and instructor.

HE STANDARD 120-SEMESTER-HOUR PROGRAM

ne hundred and twenty semester hours of course work are required for raduation. In addition to the requirements stated on pages 74-75, 82-83, at least 1 hours of course work outside of the major department or program are re-uired. The student should consult his adviser at each registration about his hoice of courses.

Each student should declare his major as soon as he is able, preferably by he completion of his 30th semester hour. He may change the major only with he consent of the Dean and of the department or committee concerned, and e must meet the requirements for the new major in effect at the time the hange is approved.

Students transferring from other institutions or from other schools, colleges, r divisions in this University, with major requirements wholly or substantially net, must satisfy the residence requirement of Columbian College (see page 82).

THE 90-SEMESTER-HOUR PROGRAM

The 90-semester-hour degree program is designed for the exceptionally able student. This program, which leads to the regular Columbian College degrees, makes it possible to graduate in three normal academic years with a total of 90 semester hours of credit instead of the standard 120. Students in this program must complete all of the requirements for the three-year degree in the semester in which he achieves his 90th semester hour.

The requirements for this program are (1) 90 semester hours of credit earned in college courses (that is, the 90-hour requirement may not be reduced by credit earned through examinations); (2) completion of the chosen major-field program and general curricular requirements; (3) grades of *A* in at least 45 semester hours of course work and *no* grades below *C;* (4) at least 60 semester hours of credit earned in 100-level courses; and (5) recommendation of his major department or program.

To be eligible for this program, the student must show evidence of exceptional academic ability by college record, performance in college courses, and other appropriate information.

An interested student should make application directly to his major-field departmental chairman or program director as soon as possible, preferably by the end of his first year of study. His academic record to that point will, of course, provide a useful criterion of eligibility.

A transfer student may qualify for graduation under the 90-hour program

provided he satisfies the residence requirement of Columbian College (see 82) and earns grades of *A* in no less than 45 semester hours of course

A student who fails to maintain the required academic performance studying toward the 90-hour degree program simply continues for the sta 120-hour degree.

BACHELOR OF ARTS

The Bachelor of Arts degree is offered in the following fields:

American Civilization
American Literature
Anthropology
Applied Mathematics
Applied Statistics
Art History
Biology
Botany
Chemistry
Chinese Language and Literature
Classical Archaeology and Anthropology, studies in
Classical Archaeology and Classics, studies in
Classical Humanities
Dramatic Art
Economics
English Literature
Environmental Studies
Fine Arts
French Language and Literature
Geography
Geology
Germanic Languages and Literatures
History
Journalism
Latin
Latin American Studies
Mathematical Statistics
Mathematics
Music:
  Applied Music
  Music History and Literature
  Music Theory
Philosophy
Physics
Political Science
Psychology
Religion
Russian Language and Literature
Russian Literature and Culture—in Transl
Sociology
Spanish American Literature
Spanish Language and Literature
Speech Communication
Speech Pathology and Audiology
Zoology

COMBINED DEGREES OF BACHELOR OF ARTS AND DOCTOR OF MEDICINE

A candidate for the combined degrees of Bachelor of Arts and Doctor of M icine must (1) complete the Medical School entrance requirements; (2) c plete the general requirements stated on pages 74-75, 82-83; (3) accumulat semester hours in the liberal arts, including a minimum of 30 in second-gr courses in Columbian College; (4) obtain the approval of the Dean of Col bian College at the time of entering the School of Medicine; (5) obtain the ommendation of the Dean of the Medical Center at the completion of all scribed courses in the first year of the School of Medicine, at which time degree of Bachelor of Arts will be conferred (professional work taken another institution will not satisfy the major requirement for the combi degrees); (6) maintain tnroughout the entire course the scholarship l required for graduation.

CHELOR OF SCIENCE

e Bachelor of Science degree is offered in the following fields:

Applied Mathematics
Applied Statistics
Biology
Botany
Chemistry
Environmental Studies
Geology
Mathematical Statistics
Mathematics
Physics
Zoology

HE UNDERGRADUATE MAJOR

here are two types of undergraduate majors: the Field-of-Study Major and the epartmental Major. Four majors, Latin American Studies, Classical Archaeology and Anthropology, Classical Archaeology and Classics, and Environmental tudies, although interdepartmental in nature, are governed by the regulations f the Departmental Major.

ield-of-Study Major

ach Field-of-Study Major covers a carefully worked out field of coordinated tudy and is under the supervision of the appropriate department and the olumbian College Committee on Studies.

The Field-of-Study Major requires no specific program of courses, although he student is required to meet the over-all general requirements for the degree. Ability to pass the Major Examination is assumed to be a convincing emonstration that the student possesses the breadth, depth, and quality of nowledge of his major usually defined in terms of semester hours, courses, and grades. Information on each field is obtainable from the department. The rospective student should place himself under the direction of the appropriate dviser immediately upon declaring his major.

The Field-of-Study Major places special emphasis on the intellectual development of the individual student. Programs in the same major may vary, depending upon the individual student's background, previous study, and aptitudes. The student is expected to consult his adviser frequently, and the special proseminar offered in some fields gives him further opportunity for individual advice and direction in pursuing a program especially adapted to his needs and abilities. A close student-adviser relationship is essential for the student's success under the Field-of-Study Major plan.

The following Field-of-Study Majors are offered: American Civilization, American Literature, Chinese Language and Literature, English Literature, French Language and Literature, History, Religion, Russian Language and Literature, Russian Literature and Culture—in Translation, Spanish American Literature, Spanish Language and Literature.

PROSEMINAR IN THE MAJOR

A proseminar is offered in most fields to help the student acquire a coordinated knowledge of his field through reading, study, and laboratory exercises. It is a presentation of the content and methods of the major field as a whole through the organization and coordination of the knowledge obtained in the

various formal courses in the major subject and of material not usual cluded in such courses. This course is not required, but, if it is elected, attendance is essential. Six semester hours, but no qualitative grade, m assigned. When registered in this course, the student has the privilege of ing, subject to the approval of the instructor, any other appropriate c offered in the College. (Regular attendance in a course, either for cre as an auditor, requires registration and payment of tuition.) Proseminar open only to the student who has been accepted as a candidate under specific major.

THE MAJOR EXAMINATION

The Major Examination will normally be taken at the close of the senior a student on a limited schedule may take it no earlier than one calendar before graduation. A student who fails to pass a Major Examination m the discretion of the Committee on Studies, be re-examined at a later re major-examination period. The Committee on Studies has general super of the preparation, reading, and grading of Major Examinations. Majo aminations are held each semester on dates fixed by the department or d ments concerned, but in no case later than December 1 for the fall sem April 13 for the spring semester, and August 26 for the summer sessions.

Departmental Majors

Departmental Majors, unlike Field-of-Study Majors, are defined in ter credit hours, required courses, and the attainment of the grades of *A* in half of the second-group courses taken in the major field. The mini specific requirements for Departmental Majors are listed below the of instruction of the department concerned. The Chairman of the Depart or designated departmental adviser, should be consulted at registration cerning the student's program of courses; and the entire program, incl electives, must be approved by the Department. The student is also exp to consult the Chairman or adviser in all matters affecting his progra studies, such as changes, substitutions, or withdrawals, and especially con ing his progress in his course. A close student-adviser relationship is desi

Departmental Majors are offered in the following: American Literature thropology, Applied Mathematics, Applied Statistics, Art History, Bi Botany, Chemistry, Classical Archaeology and Anthropology (interde mental), Classical Archaeology and Classics (interdepartmental), Classica manities, Dramatic Art, Economics, English Literature, Environmental St Fine Arts, French Language and Literature, Geography, Geology, Ger Languages and Literatures, Journalism, Latin, Latin American Studies departmental), Mathematical Statistics, Mathematics, Music (Music Histor Literature, Music Theory, Applied Music), Philosophy, Physics, Po Science, Psychology, Sociology, Spanish American Literature, Spanish guage and Literature, Speech Communication, Speech Pathology and Audi Zoology.

Double Majors

A student who completes the requirements of two major fields (e.g., M matics and Physics, or English and Latin, or History and Economics,

y graduate with a double major. A student wishing to graduate with a uble major should consult with advisers in the two departments concerned d declare both majors on the appropriate forms available in the Dean's Office.

terdisciplinary Programs

Regular Interdisciplinary Programs.—Several programs presently exist, in-uding American Civilization, Classical Archaeology and Anthropology, Classi-l Archaeology and Classics, Environmental Studies, and Latin American udies.

Special Interdisciplinary Programs.—A student who finds no existing major program suited to his educational goals may develop a special major pro-am of his own, in consultation with appropriate departmental advisers. inal approval of such a program rests with the Committee on Programs. Only rograms with valid and clearly defined academic goals will be approved.

ACHELOR OF SCIENCE IN MEDICAL TECHNOLOGY

n cooperation with the University Hospital and the Department of Pathology f the School of Medicine, Columbian College of Arts and Sciences offers ork leading to the degree of Bachelor of Science in Medical Technology. The rogram leading to this degree will be extensively revised beginning with the cademic year 1973-74. Students who have already completed one or more years f the four-year program prior to September, 1973, will not be affected by these hanges; they will continue under the old program of study listed below. Stu-ents beginning their freshman year in September, 1973, will follow the new program listed below.

The Old Program (Medical Technology Curriculum I).—A candidate for the degree must complete the first two years of the Medical Technology Curriculum I listed on page 77. A minimum of 60 semester hours of the 120 hours required for the degree must be spent at this University (i.e., 30 hours in residence in Columbian College, and 30 hours in the Medical Technology Course—Path 115-16, 117-18, 119-20—in the University Hospital). In the junior year, the following courses are required: (1) Chem 50; and (2) B Sc 163 and 164, or one course selected from B Sc 104, 127, 148, 154, 165. All or most of the remaining courses in the junior year should be selected from nonscience courses. In the senior year the candidate must complete the 12-month Medical Technology Course at the University Hospital, which constitutes the major.

Each candidate must make application to take the 12-month Medical Technology Course at the University Hospital; this should be done early in the junior year. While admission to the Columbian College degree program does not assure acceptance into the Medical Technology Course, George Washington University students are given preference.

A number of scholarships are provided by the University Hospital for the students enrolled in the fourth (senior) year of the degree program.

The New Program (Medical Technology Curriculum II).—A candidate must complete the first two years of the Medical Technology Curriculum II listed on pages 77-78. Students wishing to transfer into this program from another university after the second year must show evidence that the content of their first two years of study was comparable to that listed on pages 77-78. A minimum of 61 semester hours of the 123 hours required for the degree must be

spent at this University (i.e., 30 semester hours in residence in Columbian lege; and 31 hours in the Medical Technology Program—Path 111, 121, 141 in the School of Medicine and Path 151 (January-June) in the versity Hospital). In the junior year students are required to take Chem 22 B Sc 127; Phys 3; Phyl 191; and 12 semester hours of nonscience ele courses.

Application for the junior year of this program must be made by Marc preceding September enrollment.

A number of scholarships are available for students enrolled in the l months of this degree program.

Upon the satisfactory completion of the four-year Medical Technology riculum, either I or II, the student is eligible to take the certifying examin for Medical Technologists given by the Board of Registry of the Amer Society of Clinical Pathologists.

For further information, contact the Department of Pathology, Ge Washington University, Washington, D.C. 20006; telephone 331-6640.

RADUATE SCHOOL OF ARTS AND SCIENCES

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* The President of the University and the Vice President for Academic Affairs are ex officio of the Dean's Council.

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ert Allen, Wallace Bowman, Cary Carson, Grose Evans, Alan Fern, ph Fulton, F.R. Goff, Alan Jabbour, J.B. Kuiper, Philip Lundeberg, Vernon Kay, Robert Sauer, J.W. Witherell

HISTORY AND ORGANIZATION

Graduate School of Arts and Sciences is responsible for advanced study research leading to Master's degrees and the degree of Doctor of Philosoin the arts and sciences. Graduate programs at George Washington Unisity were first formally organized under a graduate School in 1905, followseveral decades of gradual growth in a number of departments. In 1930 Graduate School was discontinued. Columbian College, the University's eral arts college, then assumed responsibility for the Master of Arts and ster of Science degrees, and a newly created Graduate Council adminised all Doctor of Philosophy programs. Professional schools took responsiity for advanced degrees in the professional fields.

In 1967 the Graduate Council and the Graduate Division of Columbian llege were consolidated into a new Graduate School of Arts and Sciences. l graduate programs in the arts and sciences leading to the degrees of Master Arts, Master of Arts in Special Studies, Master of Fine Arts, Master of usic, Master of Science, Master of Science for Teachers, Master of Science Forensic Science, Master of Science in Special Studies, and Doctor of ilosophy are under the Graduate School.

In addition, a Master of Philosophy degree is awarded by the School, upon commendation of the appropriate department, to students who have successlly completed the General Examination for the Doctor of Philosophy degree.

The School is under the direction of the Graduate Faculty of Arts and Sciaces. It is the responsibility of the Faculty to set the requirements for admison to the School, to provide courses and programs of study and research for students, to establish academic standards for its degrees, to recommend to e Board of Trustees the awarding of degrees, to lay down regulations as eeded for the operation of the School, and generally to supervise its activities.

The administration of the School is vested in the Dean, who is Chairman of e Dean's Council, which is responsible to the Faculty of the School for all olicy matters.

ADMISSIONS REQUIREMENTS

Application forms for admission to graduate study are obtained from the Office f the Dean of the Graduate School of Arts and Sciences. When completed, hese application forms must be submitted to this Office, together with college ranscripts and letters of reference.

Applicants must have academic backgrounds of excellence, usually with majors, or equivalent, in the fields in which they intend to study for advanced degrees. Normally, a *B* average (or equivalent) from an accredited college is required. With evidence of special promise, such as high Graduate Record Examination scores, an applicant may be accepted whose academic record

falls short of *B*. The minimum does not assure automatic acceptance. departments may, and often do, set higher admission standards. Mor the number of spaces available for new graduate students limits the n that can be accepted. Students who apply in their senior year must have pleted their baccalaureate work before registration in the Graduate Scho must present evidence of such completion. Students whose native langu not English are required to take the *Test of English as a Foreign La* (TOEFL), administered by the Educational Testing Service, Princeton

Application for Admission.—Completed applications and requests for f ship support must be submitted by February 15 for admission in the fall ter and by November 1 for the spring semester. Applications for gr study are acceptable after these dates for admission in the corresp semester and will be reviewed if time permits and if space is available program desired.

Readmission.—A student who has failed to maintain continuous regist and wishes to resume his graduate program must file an application fo be considered for readmission. Readmission is not guaranteed, and the cation is subject to review by the department concerned and the Dean student may be required to take qualifying examinations on the course completed. Application forms are available in the Graduate School Offic

REGULATIONS

Regulations regarding ADMISSION, REGISTRATION, FEES AND FINANCE *stated on pages 21-33; other University regulations, on pages 43-51.*

In addition, the Graduate School publishes a Student Handbook each demic year which contains updated information on the School's policies, lations, and other matters of concern to enrolled or admitted students.

GRADES

Grades for graduate work are *A*, Excellent; *B*, Good; *C*, Minimum Pa Fail; *I*, Incomplete; *W*, Authorized Withdrawal; *CR*, Credit.

The symbol *I* (Incomplete) indicates that a satisfactory explanation has given to the instructor for the student's failure to complete the required for a course. The "Incomplete" must be made up before the lapse of on endar year. An "Incomplete" which is not removed within one calendar remains as a grade of *I* on the student's record. The grade of *I* cann removed by reregistering for the course here, or by taking its equivalent where.

The grade of *I* is also given for all thesis and dissertation research c until the thesis or dissertation is completed. Upon the satisfactory comp of the thesis or dissertation the grade *I* is changed to *CR* automatically grade of *CR* is given for an *Advanced Reading and Research* (usually bered 398) course. The grade of *CR* is given for Stat 49 (a tool course).

SCHOLARSHIP REQUIREMENTS

Graduate students are expected to maintain a minimum accumulative average of *B* (3.00) in all course work in the program of studies. Indiv

tments may require a higher average. The fields of Art History, English, ry, and Psychology require a 3.25 average.

the case of a student who receives a grade of *F* for a course in his pro- of studies, the Graduate School will require a departmentally approved n statement, justifying the student's continuance in the Graduate School utlining the program to be followed. Continuation is contingent upon the 's approval. A course in the program of studies for which an *F* is re- d cannot be subsequently removed from the program even though an- course is taken as a substitute.

student may repeat for credit a course in which he has received a grade or above *only when permitted to do so by the department concerned,* s the course description states that the course may be repeated for credit. ritten statement to this effect must be submitted for approval to the Dean's e by the appropriate departmental adviser. It is then filed with the strar.

graduate student may take an advanced undergraduate course (courses bered 101-200) for graduate credit only upon the approval of the Dean the department at the time of registration. Such approval is granted only the provision that students complete additional work in order to receive luate credit.

OGRAM OF STUDIES

program of studies must be approved by the departmental adviser and filed he Graduate School Office no later than November 1 for graduate students ering in the fall semester, or March 15 for graduate students entering in the ing semester. A program of studies may be revised, when necessary, by ob- ining the approval of the departmental adviser and the Dean. The revision st be filed in the Graduate School Office.

NTINUOUS REGISTRATION

students must maintain continuous registration while working toward a de- ee, except during the summer session. If continuous registration is not main- ned, the student is dropped from the degree program unless leave of absence granted by the Graduate School.

EAVE OF ABSENCE

a student is temporarily unable to continue his program of studies, he may quest leave of absence for a specific period of time, not to exceed one cal- ndar year. An exception is made for students granted Military Leave. A stu- nt who is called to active duty (or who enlists) may be granted Military eave (see page 47) for the duration of his period of military duty upon resentation to the Graduate School of a copy of his orders and a request for uch leave. When the period of leave has expired, it is the student's respon- ibility to notify the Graduate School at least two months in advance of a given egistration period of his intention to reregister. If he fails to reregister, his andidacy will be terminated.

WITHDRAWAL

Graduate students who intend to withdraw from the Graduate School sh inform the School in writing. The last day for *complete* withdrawal wit academic penalty is at the end of the eighth week of classes.

GRADUATION REQUIREMENTS

All students must file an "Application for Graduation" form and pay the quired graduation fee at the time of registration for the last semester or s mer session of the final year in which they intend to graduate. The student m be registered in the Graduate School during the semester he plans to gradu Master's and doctoral candidates may graduate in May, February, or Sept ber. A student who has completed the requirements for a degree but has yet been awarded the degree will be issued a letter to this effect upon requ

DEGREES

Listed below are the degree programs of the Graduate School of Arts and ences and the specific degrees offered, by field. The programs are directed the departments concerned. Degree programs which bridge two or more partments are directed by committees composed of members of the dep ments concerned. For further information write to the Dean or the chairm of the appropriate department.

The degrees of Master of Arts in Special Studies and Master of Science Special Studies are designed for students who do not wish to concentrate specific field such as those listed below, but instead are interested in in disciplinary programs. It is possible to group several of these fields toge to make an interdisciplinary program; the program of studies is determined the student in consultation with the Deans of the Graduate School. The stud may choose courses from those fields that he feels are pertinent to his acade goal; however, he cannot have more than one-third of the courses from one department. Once a student has selected the group of courses that believes fulfills his needs, the program is judged on its academic merit by Dean. The student must then obtain permission to take the courses from appropriate departments.

The Graduate School of Arts and Sciences is offering a new program studies on campus leading to the degree of Master of Arts in Special Stud with a concentration in Women Studies (see page 458). The School is also off ing Master of Arts and Master of Science in Special Studies degrees in spec academic areas at off-campus locations (see page 103).

GRADUATE FIELDS

The graduate course work offered in support of the degree programs in following list is shown by department in this CATALOGUE.

Subject	Degrees Offered	
Humanities		
American Civilization	M.A.	Ph.D.
American Literature	M.A.	Ph.D.
Art:	M.F.A.	
Ceramics		
Design		
Graphics		
Painting		
Photography		
Sculpture		
Art History	M.A.	
Art Therapy	M.A.	
Classical Archaeology, Classics, and History	M.F.A.	
Dramatic Art	M.A.	Ph.D.
English Literature	M.A.	Ph.D.
French Language and Literature	M.A.	
Germanic Languages and Literatures	Mus.M.	
Music:		
Applied Music		
Conducting		
Music Composition		
Music Theory		
Musicology	M.A.	
Philosophy	M.A.	
Religion	M.A.	
Religion and Medical Care	M.A.	
Religious Education	M.A.	
Russian Language and Literature	M.A.	Ph.D.
Spanish American Literature	M.A.	Ph.D.
Spanish Language and Literature		
I. Social Sciences		
Anthropology	M.A.	
Economics	M.A.	Ph.D.
Geography	M.A.	
History	M.A.	Ph.D.
		Ph.D.
*International Relations	M.A.	Ph.D.
Political Science	M.A.	Ph.D.
Sociology		
II. Physical and Mathematical Sciences		
Applied Mathematics	M.A., M.S.	
Applied Statistics	M.S.	
Chemistry	M.S.	Ph.D.
Forensic Science	M.S. in Forens.S.	
Geochemistry	M.S.	Ph.D.
Geology	M.A., M.S.	Ph.D.
Mathematical Statistics	M.A.	Ph.D.
Mathematics	M.S. for Teachers, M.A.	Ph.D.
Physics	M.A.	Ph.D.

* The School of Public and International Affairs offers a Master of Arts field in International Affairs.

Subject	Degrees O
IV. Biomedical and Related Sciences	
Anatomic Pathology	M.S.
Anatomy	
Biochemistry	M.S.
*Biological Sciences	M.S.
Genetics	M.S.
Human Ecology	
Microbiology	M.S.
Mycology	M.S.
Pathology	
Pharmacology	M.S.
Physiology	M.S.
Psychology	M.A.
Speech Pathology and Audiology	M.A.

COMBINED MASTER OF SCIENCE AND DOCTOR OF MEDICINE DEG

Students interested in the combined degrees of Master of Science and D of Medicine must meet the requirements for admission of the Graduate S of Arts and Sciences and the School of Medicine.

The Master of Science program consists of a minimum of 30 se hours of credit and the fulfilling of the tool requirement (see page 9 maximum of 12 semester hours of credit for graduate-level courses *com as a part of the Doctor of Medicine degree curriculum* (and not alread plied toward the Bachelor's degree) will be allowed in fulfillment of t quirements of the Master of Science degree. The remaining 18 semester of work, which in most programs includes a thesis, must be work basic medical sciences normally required for a Master of Science degree Graduate School of Arts and Sciences.

DUAL PROGRAM FOR THE DOCTOR OF MEDICINE AND DOCTOR OF PHILOSOPHY DEGREES

A dual program is available to qualified students who seek both the Doc Medicine and Doctor of Philosophy degrees. The requirements which m fulfilled for both degrees are identical to those currently and separately lished in the School of Medicine and the Graduate School of Arts and Sci

A student working toward these degrees may apply a maximum semester hours of approved course work in the School of Medicine t the minimum of 48 hours of course work required to qualify for the eral or Cumulative Examination for doctoral candidacy. This course w normally taken during the semesters that alternate with his medical pro and in the years following the award of his M.D. degree. The student's res for the dissertation may begin concurrently with the final 24 semester hou graduate course work leading to the General or Cumulative Examination. estimated time for the completion of this dual program is six years.

In order to enter the dual degree program, a prospective student first

* Biology, Botany, and Zoology.

y for and gain admission to both the Graduate School of Arts and Sciences the School of Medicine separately through established procedures. Upon ission to both schools, he may then apply for affiliation with the dual degree gram. Work toward the Doctor of Philosophy degree is performed under jurisdiction of a *departmental* Doctoral Committee.

REQUIREMENTS FOR THE DEGREES

E MASTER'S PROGRAMS

st of the requirements listed below are applicable to candidates for the de- es of Master of Arts, Master of Arts in Special Studies, Master of Fine s, Master of Music, Master of Science, Master of Science for Teachers, ster of Science in Forensic Science, and Master of Science in Special Studies.

1. *General Requirements.*—For a Master's degree program *including* a sis, the satisfactory completion of a minimum of 30 semester hours of ap- oved graduate work, including 6 semester hours of thesis research, is required. r a Master's degree program which does *not* include a thesis, the number of mester hours of approved graduate course work is determined by the depart- ent, and normally consists of from 30 to 36 semester hours. The program thout the thesis is not an individual student option and is not available in ery department. Departments can and often do set requirements above the inimum required by the Graduate School. The program of study leading to the gree of Master of Arts in Special Studies or Master of Science in Special udies consists of 36 semester hours of approved graduate course work and oes not require a thesis.

Work taken to make up deficiencies is never counted as part of the require- ents leading to a Master's degree. Upon approval, up to one-half of the re- uired graduate work may be taken in courses offered by the other affiliated stitutions of the Consortium of Universities of the Washington Metropolitan rea, Inc., or by another degree-granting division of this University. If credit transferred from another institution (see "Transfer of Credit" below), the umber of semester hours which may be taken at an affiliated Consortium nstitution is reduced by the number of hours accepted as transfer credit.

It is expected that a Master's candidate will complete degree requirements vithin 3 years. Extensions beyond this 3-year period require approval of a vritten request.

2. *Academic Work Load.*—Full-time students register for 9 to 12 semester ours each semester; part-time students register for a minimum of 6 semester ours each semester. These requirements do not apply when a student has ewer than 9 semester hours (full-time) or 6 semester hours (part-time) re- naining to complete his program. No more than 15 semester hours may be aken during any one semester.

3. *Transfer of Credit.*—A maximum of one-quarter of the semester hours of graduate course work required for a degree may be approved for transfer to the Graduate School from the Division of University Students, another degree-granting division of this University, or another accredited college or university under the following conditions: the course work must have been taken prior to admission to the Graduate School, it must be approved as part of the student's program of studies, it must not have been applied to the completion of

requirements for another degree, it must be graduate-level course work, it have been taken within the past two years, and the student must have rece a grade of *B* or better. This action must be approved on a "Request F by the departmental adviser and the Dean. A transcript of the course must be on file before the request can be considered.

4. *Tool Requirement.*—Except for candidates for the degrees of Maste Arts in the field of Art Therapy, Master of Arts in Special Studies, Maste Music, Master of Science in Forensic Science, and Master of Science in Sp Studies; candidates for Master's degrees in the Department of Mathema and candidates in the field of Dramatic Art for the degree of Master of Arts, Master's candidates normally must complete successfully a tool req ment in a foreign language, mathematics, statistics, or computer programm In place of a tool requirement, candidates for the degree of Master of Fine in the fields of Ceramics, Design, Graphics, Painting, Photography, or Sculp will complete a methods course selected by the Department of Art.

The tool requirement examination should be passed prior to the begin of the third semester of graduate work; students who have not fulfilled requirement must register for the appropriate course at the beginning of third semester. Courses taken to satisfy the tool requirement cannot be cou in the semester-hour requirement for the Master's degree. No Master's ca date may attempt a tool examination more than three times. A tool require fulfilled at another university cannot be used to fulfill the requirement at University.

With the approval of the department directing the student's program of st the tool requirement may be selected from the following options:

(a) Passing a foreign language reading examination (a student may regi for the appropriate reading course for nonmajors or make arrangements the appropriate department to take the examination on the scheduled dates). student majoring in a foreign language may not select that language to sat this requirement; a student whose native language is not English may e English as the tool (students choosing English should contact the Eng Department).

(b) Mathematics, statistics, or computer programming—a student may eit complete one of the following courses with a grade of *B* or better, or pas special examination, administered by the appropriate department, at the le of the final examination: Epid 230; Math 31; Stat 49, 117, 118, 197. courses represent the minimum requirement; some departments may req a higher level of proficiency.

5. *The Thesis.*—The main purpose of a Master's thesis is to demonstr the student's ability to make independent use of the information and train acquired through his other disciplines and to furnish objective evidence of constructive powers in his chosen field. The student registers for 6 semes hours of thesis research and must complete the thesis no later than three cale dar years after his initial registration. The student must maintain continuo registration during the period required to complete the thesis. Registration thesis research entitles the student to the advice and direction of the member the faculty under whom the thesis is to be written. The thesis subject must approved by the professor who will be directing the thesis. The thesis, in final form with one copy and a certificate of approval signed by the thes director and at least one departmental reader, must be presented to the De

later than the date announced in the University Calendar. All theses must eet the form, style, and other requirements set forth in a pamphlet, *Informa-n Concerning Theses and Dissertations*, available in the Office of the Dean.

6. *Master's Comprehensive Examination.*—Most Master's degree candidates ust pass a Master's Comprehensive Examination in the major subject. Ex-ninations are held on dates fixed by the departments, so that results can be ed in the Graduate School Office no later than the day before the faculty eets to approve the list of graduates (approximately two weeks before aduation).

A student who fails to pass the Master's Comprehensive Examination may, exceptional circumstances, and with the approval of the department and the ean, repeat the Examination at the next scheduled Examination date. If he ils a second time, no further opportunity to take the Examination is permitted.

HE DOCTOR OF PHILOSOPHY PROGRAM

he minimum requirements for the doctoral program are as follows:

1. *General Requirements.*—The program leading to the degree of Doctor of hilosophy requires the satisfactory completion of a minimum of 72 semester ours of approved graduate work for entering students whose highest earned egree is a baccalaureate. A minimum of 48 of these hours must be taken in reparation for the General Examination. Entering students whose highest arned degree is a Master's degree are required to register for a minimum of 48 emester hours of approved graduate work, no fewer than 24 of which must be aken in preparation for the General Examination. While completing the dis-ertation portion of the program, the student must register for 12 to 24 semester ours of *Dissertation Research*, depending on the number of hours completed rior to the General Examination. The exact number of semester hours re-quired for any part of the total program is assigned by each department and may exceed the minimum required by the Graduate School.

2. *Academic Work Load.*—Full-time students register for 9 to 12 semester hours each semester; part-time students register for a minimum of 6 semester hours each semester. These requirements do not apply when a student has fewer than 9 semester hours (full-time) or 6 semester hours (part-time) re-maining to complete his program.

3. *Transfer of Credit.*—Entering students who do not hold a Master's de-gree may request transfer of up to 24 semester hours of credit toward a doc-toral degree for acceptable graduate work taken at the Master's degree level at George Washington University or another accredited college or university.

4. *Tool Requirements.*—As early as possible, and *before* completion of the General Examination, the tool requirements specified in the program of study must be completed. The following rules apply to students permitted to elect (a) or (c) below: students entering the Graduate School with a Bachelor's degree must satisfy the first tool requirement before completion of 15 semester hours of course work; students entering with a Master's degree must satisfy the first tool requirement no later than the second semester of registration as a Doctor of Philosophy student. Courses taken to fulfill the tool requirement are not counted in the semester-hour requirement for the Doctor of Philosophy degree program. The tool options are as follows:

(a) two foreign language reading examinations;

(b) high-level proficiency in one foreign language;

(c) one foreign language reading examination and the completion of one the following courses with a grade of *B* or higher: Epid 230; Math 31; Stat 117, 118, 197.

A doctoral student whose native language is not English may not elect native language to meet a foreign language examination requirement. With approval of his department, he may elect English to fulfill the language requirement in any of the options listed above except (b). The student who is given approval to take a language examination in English should make arrangements with the Department of English.

A doctoral student may omit a tool preparation course at George Washington University if he has had a similar course at another college or university. However, his proficiency in that tool must be validated by an examination at this University.

Further details for meeting the various tool requirements are stated in the Graduate School's Student Handbook.

5. *The General Examination.*—Each student is required to complete the General Examination no later than the semester following the completion of course requirements. The General Examination is composed of a written examination 5 to 6 hours in length in each of the areas of study comprising the student's total program; the time permitted between each examination is determined by the administering department. Some departments permit one or two areas of study to be "written off"; that is, a special, shorter examination is given after a year of course work in the area. A cumulative examination system is in effect in the fields of Chemistry and Physiology, and in the field of Psychology a system of two comprehensive examinations is used. Students in these fields should consult the appropriate department for information about its system.

6. *The Degree of Master of Philosophy.*—Upon departmental recommendation, the degree of Master of Philosophy may be awarded to students who have successfully completed all requirements for the Doctor of Philosophy degree up to and including the General Examination. Not all departments recommend students for this degree.

7. *The Dissertation and Final Examination.*—A dissertation is required of each doctoral candidate as evidence of his ability to perform scholarly research and interpret its results. The candidate normally enrolls for *Dissertation Research* upon completion of the General Examination; however, he may register for up to one-half of the required number of semester hours of *Dissertation Research* during the time the General Examination is being completed. After the required number of hours of *Dissertation Research* has been taken, if more time is needed to complete the dissertation, the student must maintain continuous registration (see page 47) each semester until the dissertation is finished and the Final Examination is passed. If the dissertation is not completed within 5 years after the date of the General Examination is completed, the student may be required to retake the General Examination.

No later than the date specified in the University Calendar, the candidate must submit to the Dean the original and one copy of the dissertation and an abstract for inclusion in the Announcement of the Final Examination and for reproduction by University Microfilms, Inc.

When the dissertation has been approved by the Director and two members of the Doctoral Program Committee and filed with the Dean, the candidate

akes the Final Examination, an oral examination which is open to the public. A committee of examiners (composed of Graduate School Faculty and, when appropriate, outside scholars) conducts the Examination. If the candidate passes, he is recommended by the Graduate School for the degree of Doctor of Philosophy.

Detailed information regarding regulations for the form and reproduction of the dissertation is available in the Office of the Dean. The successful candidate for the doctorate is required, before receiving his degree, to pay a fee to cover the expense of printing the Announcement of the Final Examination, and for the basic service rendered by University Microfilms, Inc.

POSTDOCTORAL STUDY

George Washington University doctoral graduates may continue any studies in the University without payment of tuition, and enjoy all University library privileges. Such graduates are required to pay the usual "continuous registration" fee and the University Center fee in order to establish their active membership in the University. The use of laboratory space and equipment is contingent upon availability, and the cost of all laboratory or special library material is paid by the graduate. Special arrangements for such privileges must be made with the Dean two months in advance of the semester in which the graduate wishes to register. Postdoctoral work taken under this privilege may not be applied toward any degree offered by the University.

FELLOWSHIPS AND FINANCIAL AID

A limited number of graduate teaching fellowships are available in most departments of instruction to students registered in the Graduate School of Arts and Sciences. In addition, the University participates in the National Defense Education Act (Titles IV and VI) Fellowship program. Other kinds of sponsored and University awards are available, but limited.

Students applying for admission who also wish to apply for a fellowship should submit the fellowship application and the application for admission by February 15; the necessary transcripts, Graduate Record Examination scores, and letters of recommendation should also be on file by this date. Students currently enrolled in the Graduate School should submit only the fellowship application and have current letters of recommendation on file by February 15.

Forms are available at the Office of the Graduate School of Arts and Sciences. Filing the fellowship application entitles the student to consideration for all awards available in his department.

Students who wish to apply for loans should indicate their intent to do so on the application for admission. Information concerning loans is contained in a booklet, *Student Financial Aid*, available from the University's Student Financial Aid Office.

COOPERATIVE PROGRAMS

The American Studies Program at George Washington University is affili with the American Studies Program of the Smithsonian Institution. This rangement offers the student in the field of American Civilization an opp tunity to take advantage of the Washington environment. Members of the st of the Smithsonian's American Studies Program, Museum of History and Te nology, National Portrait Gallery, National Gallery of Art, and National Gall of Fine Arts offer seminars and tutorial instruction in fields which provide student with an unusual opportunity to develop new dimensions in the discip of American Civilization. This program of study is open to students worki toward the degrees of Master of Arts and Doctor of Philosophy, and is inten to prepare them for research, teaching, and museum-related careers.

The Department of Art at George Washington University and the Smiths ian Institution offer a joint graduate program of study and research in musc studies leading to the degree of Master of Arts in the field of Art History w a concentration in Museum Training. The Department has also establishe program of study in affiliation with the Textile Museum, the Corcoran Gall of Art, and area private art galleries.

A program of study leading to the degree of Doctor of Philosophy American Civilization with emphasis on library research and collections offered jointly by George Washington University and the Library of Congr The coordinator of the Library Program and his staff offer an orientat seminar and other courses and supervise students in reading and resear and in work on such library problems as indexing, cataloguing, and bib ography.

For further information concerning these programs contact one of the follo ing offices at George Washington University: the Graduate School of Arts a Sciences for those who are interested in any of the fields listed above, t Department of Art for those interested in Museum Training, the Americ Studies Program for those interested in the American Civilization field.

George Washington University, in cooperation with three other region universities and the Folger Shakespeare Library, has established the Folg Institute for Renaissance and 18th Century Studies as a cooperative ventur in graduate studies in the humanities. Seminars (limited to twelve students each are offered each semester under the direction of outstanding American an foreign scholars. The Folger Library is the physical center for the Institute. A participants enrolled in the seminars are granted access to the collections of rar books, manuscripts, and reference materials of the Library. There are also op portunities for participants to establish personal relationships with the fellow and readers at the Library, in the furtherance of their research. All registered students are eligible to apply for admission to one or more of the seminars, al though priority in enrollment will be accorded to graduate students working o dissertations and to postdoctoral scholars from the sponsoring institutions.

Further information, including a listing of seminar topics, is available in the Office of the Graduate School of Arts and Sciences of George Washington University or at the Folger Shakespeare Library.

The University and the National Bureau of Standards have entered into a cooperative agreement to further educational opportunity at both the Univer

ty and the Bureau. This arrangement holds great promise for graduate study nd research, particularly in the physical sciences.

SPECIAL OFF-CAMPUS DEGREE PROGRAMS

he Graduate School of Arts and Sciences is currently offering the following pecial degree programs off campus: (1) the degree of Master of Arts in Special tudies with areas of concentration in Legislative Affairs or Urban Learning, nd (2) the degree of Master of Science in Special Studies with areas of con- entration in Investigative Techniques, Oral Biology, or Telecommunication Operations. The program in Oral Biology is offered in cooperation with the Naval Graduate Dental School of the National Naval Medical Center, Be- hesda, Md., and in cooperation with the United States Army Institute of Dental Research at the Walter Reed Army Medical Center, Washington, D.C. The programs are open only to dental officers on active duty with the U.S. Armed Forces or with other federal agencies.

The Graduate School has academic jurisdiction over these off-campus pro- grams which are administered by the College of General Studies. For details consult the Graduate School of Arts and Sciences or the *College of General Studies* catalogue.

SCHOOL OF EDUCATION

Dean Rodney Tillman
Assistant Dean R.E. Baker
Executive Assistant to the Dean L.H. Kornhauser

FACULTY*

Professors J.G. Allee, Jr., G.L. Angel, R.E. Baker, J.G. Boswell, Perry Bot
J.L. Breen, Marcella Brenner, W.T. Carroll, Mary Ellen Coleman, V.J.
Angelis, L.H. Elliott, R.G. Hanken, Donald Hawkins *(Research)*, A.D. Kir
Anthony Marinaccio, Leonard Nadler, Martha Rashid, Carol St. Cyr, D
Sinick, Loretta Stallings, Rodney Tillman, C.E. Vontress
Associate Professors S. Leigh Clark, R.S. Cottrell, Jr., R.J. Frankie, Lyn
George, Rita Ives, Eva Johnson, Virginia Kirkbride, Donald Linkowski, M
garet McIntyre, Dorothy Moore, Jeanne Snodgrass, Lawrence Winkler, M
Withers
Assistant Professors L.O. Bascue, Gloria Horrworth, Nancy Johnson,
Kuhagen, Honey W. Nashman, S.R. Paratore, Ruth Peterson, R.W. Pro
J.R. Shotel, G.W. Smith, M.G. Van Dyke, G.D. Wiggs
Instructors Miriam Barteaux, Mary Campbell, Florence McGarry, Na
Roche

MEMBERS OF THE ADVANCED GRADUATE FACULTY

G.L. Angel, R.E. Baker, J.G. Boswell, Perry Botwin, J.L. Breen, Marc
Brenner, W.T. Carroll, R.S. Cottrell, Jr., L.H. Elliott, R.F. Frankie, Gloria H
worth, Rita Ives, Virginia Kirkbride, A.D. Kirsch, Donald Linkowski, Anth
Marinaccio, Dorothy Moore, Leonard Nadler, Ruth Peterson, Martha Rash
Carol St. Cyr, Daniel Sinick, Loretta Stallings, Rodney Tillman, C.E. Vontr
G.D. Wiggs, Lawrence Winkler

COMMITTEES†

THE DEAN'S COUNCIL‡

1972: R.J. Frankie, Loretta Stallings
1973: Bertice Cornish, Donald Linkowski
1974: Perry Botwin, Leonard Nadler

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* The President of the University, the Vice President for Academic Affairs, the Registrar of t
University, the Director of Admissions of the University, and the University Librarian are ex offic
members of the Faculty of the School of Education.
† The Dean and the Assistant Dean of the School of Education are ex officio members of all co
mittees.
‡ Elected by the Faculty in the year designated to a three-year term.

)MMITTEE ON ADMISSION AND ADVANCED STANDING*

odney Tillman *(Chairman)*, Perry Botwin, J.L. Breen, Donald Linkowski, J.Y. uth

OMMITTEE ON SCHOLARSHIP

odney Tillman *(Chairman)*, Perry Botwin, J.L. Breen, Donald Linkowski

INTRODUCTION

t is the purpose of the School of Education to prepare teachers, counselors, nd administrators for leadership responsibilities, and to offer experienced eachers opportunities to extend their education. The School includes the de- partments of Education; Physical Education, Health, and Recreation; and Special Education. It offers both graduate and undergraduate work. Other de- partments of the University provide general education and subject-matter courses needed for a well-balanced program of teacher education.

Individually planned programs are provided for liberal arts and other se- lected graduates who wish to prepare for teaching. The School also provides a wide range of courses to provisional teachers who wish to qualify for teach- ing certificates and teachers who wish to renew licenses. Degree programs in adult education, higher education, human resource development, rehabilitation counseling, and student personnel work in higher education are offered.

Laboratory and clinical facilities are provided by the University Reading Center and Speech and Hearing Clinic. In cooperation with public and private schools and a wide variety of social agencies, ample opportunity for field ex- perience is provided.

In addition to a full schedule of weekday courses during the academic year, classes are offered in the evening, on Saturday, and during the summer.

HISTORICAL DEVELOPMENT

The University began offering professional courses for teachers in 1904-5, and in 1907 it established a Division of Education. In 1909, the Division of Edu- cation became the Teachers College, which in its early years was concerned largely with teacher preparation on the undergraduate level. In 1928, the Teachers College became the School of Education, and greater provision was made for advanced study. Graduate enrollment has steadily increased, and today the School has a considerably larger number of graduate than undergraduate students.

EDUCATION FOR TEACHERS

Programs are planned to provide a broad general education, adequate mastery of the teaching-field content, and professional competence. The relative em- phasis placed on each of these depends on the student's teaching-level plan.

* Appointed by the Dean.

For example, elementary school teachers, since they teach all subjects, preparation of greater breadth and less specialization than secondary s teachers.

Adequate preparation for teaching requires an acceptable minimum of years of full-time study. Five years terminating in a Master of Arts in E tion degree are needed for superior preparation which will command h salaries and opportunities for promotion. During the first two years, the st is registered in Columbian College of Arts and Sciences, the liberal arts c of the University, where he acquires the background of general educatio essential to success as a teacher. Here he is assigned a special adviser the School of Education to assist in planning his program.

REGULATIONS

Regulations concerning ADMISSION, REGISTRATION, FEES AND FINANCES *stated on pages 21-33; other University regulations, on pages 43-51.*

ACADEMIC WORK LOAD

UNDERGRADUATE

Fifteen to 17 semester hours of credit constitute a normal program. A st with a quality-point index of 3.00 or higher may, with the permission o Dean, enroll for 18 or 19 hours. No student may enroll for more than except by permission of the Committee on Scholarship.

A student employed 15 hours or less a week may carry a normal pro of college work.

A student employed from 16 to 25 hours a week may enroll for 12 o hours. With a quality-point index of 3.00 or higher he may, with special mission of the Dean*, enroll for 14 to 16 hours.

A student employed from 26 to 34 hours a week may enroll for 9 o hours. With a quality-point index of 3.00 or higher he may, with special mission of the Dean*, enroll for 11 to 13 hours.

A student employed 35 hours or more a week may enroll for 6 or 7 ho With a quality-point index of 3.00 or higher he may, with special permis of the Dean*, enroll for 9 or 10 hours.

A student who increases his hours of employment after registration or at time during a semester must report immediately to the Dean so that his gram may be adjusted, if necessary.

GRADUATE

Students employed full-time may take a maximum of 6 semester hours.

* Request forms are available at the Office of the Dean. They should be filled out and returne the Dean at least two weeks prior to Registration.

E SCHOOL OF EDUCATION OFFERS UNDERGRADUATE PROGRAMS leading to the grees of Bachelor of Arts in Education and Bachelor of Science in Physical ucation.

The program of each student must be approved by a faculty adviser. Since ch student's program is defined by his particular needs, it is important that e student have a clear concept of his major interest in education, and also at he be familiar with the teaching-certificate requirements of the locality in hich he expects to teach.

NTRANCE REQUIREMENTS

Bachelor of Arts in Education and *Bachelor of Science in Physical Educa-on.*—The satisfactory completion of the appropriate first two-year curriculum Columbian College of Arts and Sciences (see pages 78-79), or the equivalent om another accredited educational institution with a quality-point index of least 2.25 or the equivalent, is required. Applicants must, at an admissions terview, exhibit personality traits that give promise of success as a teacher.

EQUIREMENTS FOR THE DEGREES

o be recommended for a degree a student must satisfy the admission, resi-ence, scholarship, and curriculum requirements.

ESIDENCE

Candidates for the Bachelor's degree must complete satisfactorily while in the School of Education a minimum of 30 semester hours, 9 of which, with the approval of the adviser, may be in off-campus courses of the College of General Studies.

For full details concerning continuous registration, see page 47.

SCHOLARSHIP

For the system of grading and of computing scholarship, see pages 44-45.

In order to graduate, a student must have a quality-point index of at least 2.25.

Probation.—A student who fails to maintain a quality-point index of at least 2.25 is placed on probation. He remains on probation as long as his index is below 2.25, or until his probation is removed by the Committee on Scholarship.

Suspension.—A student on probation who fails to raise his index to 2.25 within the time specified may be suspended.

A student suspended for poor scholarship may, within ten days, appeal his case to the Committee on Scholarship through the Dean. If the case appears to be remediable and the student seems likely to improve his scholarship, the Committee may readmit him on probation. A student denied readmission may again, after a lapse of a calendar year, petition the Committee through the Dean for readmission. A student suspended twice will not be readmitted.

CURRICULUM REQUIREMENTS

In all Bachelor's curricula at least 30 semester hours must consist of co
numbered above 100.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized
drawal) may be assigned are described on page 44.

Removing an Incomplete.—Although the grade of *I may* remain o
records for a maximum of one year, the instructor should normally set a
briefer period within which the uncompleted work (usually the final examin
or a required paper) must be made up. The grade of *I* cannot be remove
reregistering for the course here, or by taking its equivalent elsewhere. An
complete" cannot be made up after the lapse of one calendar year exce
written permission of the Dean's Council. An "Incomplete" which is n
moved within one calendar year is automatically changed to an *F*.

CREDIT/NO CREDIT OPTION

A junior or senior student who has a cumulative quality-point index of
or better, may, with the approval of his adviser and dean, take one cou
semester and receive a grade of *CR*, Credit, or *NC*, No Credit, which w
recorded on the student's transcript but will not be reflected in his qu
point index. No student will be allowed to take more than 4 credit/no c
courses. A student must sign up for such an option at registration. Unde
circumstances may a student change from credit/no credit status to gr
status, or vice versa, after the end of registration. Courses required in
student's major field may not be taken on the credit/no credit basis. A tr
fer student may not choose this option until the second semester of his en
ment at this University.

BACHELOR OF ARTS IN EDUCATION

The objective of programs leading to the degree of Bachelor of Arts in Edu
tion is to provide (1) general educational backgrounds; (2) functional co
mand of ideas, concepts, knowledge, and skills in one or more teaching fie
(3) mastery of basic professional information and skills adequate for the beg
ning teacher; and (4) development of attitudes needed for success in teachi

The general educational backgrounds needed by prospective teachers are
tained through precollege education, college courses, work experience, lead
ship activities, student campus activities, and off-campus cultural opportuni

Normally, from 63 to 66 semester hours of the total requirement are co
pleted in Columbian College of Arts and Sciences of this University or in
equivalent institution elsewhere (see "Education Curriculum," page 78). Sin
the teaching fields differ in content, scope, and complexity, some programs
longer than others.

*Work experience, leadership activities, participation in student campus activ
ties,* and *the utilization of off-campus cultural opportunities.*—As part of form
course work and on their own initiative, students of the School of Educati
are expected to take full advantage of the many opportunities in the Washin

area for developing leadership skills. Advisers are available to help students
these experiences.

IONAL TEACHER EXAMINATIONS

candidates for the degree of Bachelor of Arts in Education are required to
the National Teacher Examinations. Students receive individual reports
test scores and may avail themselves of the regular transcript services of
Educational Testing Service. Students must request the Testing Service to
d copies of test scores to the School of Education.
Students required to take the Examinations must register for them with the
ucational Testing Service. Application forms are available in the Office of
Dean.

ACHING-FIELD PREPARATION

aching-field preparation depends upon the teaching position for which the
dent is preparing. Those planning to teach in elementary schools need a
gree of competency in several fields. Those preparing to teach in junior or
nior high schools must demonstrate competency in a major teaching field. A
inor teaching field is optional, but recommended. Ordinarily, students pre-
ring to teach in evening schools for adults are required to prove competency
only one teaching field. The student should begin teaching-field preparation
hile in the first two years in Columbian College.
Teaching-field requirements, developed in cooperation with appropriate de-
artments of the University, include satisfactory completion of prescribed aca-
emic courses in one or more fields, a satisfactory score on the special field
xamination of the National Teacher Examinations*, and satisfactory comple-
on of the prescribed special methods courses.
Prescribed academic courses vary in number in accordance with the scope
nd complexity of the teaching field and the license requirements of the vari-
us states. Minimum academic course requirements for each major teaching
eld are listed on succeeding pages. Minor teaching-field requirements are
omewhat less than those of a major field. Students preparing to teach on the
lementary level are advised to use electives to increase their mastery of con-
ent in an academic field or an area of specialization.

Art

	ART HISTORY	Semester Hours
Art 31–32: Art 71–72:	Survey of Western Art, or Introduction to the Arts in America	6
Art:	Two second-group or third-group Art History courses if open to undergraduates	6

* Special field examinations of the National Teacher Examinations are available in elementary education; early childhood education; biology and general science; English language and literature; industrial arts; mathematics; chemistry, physics, and general science; social studies; physical education; business education; music education; home economics; and art education.
Students preparing to teach history or geography take the special field examination in social studies.
Students preparing to teach in fields in which special field examinations are not available must obtain a satisfactory score on a special field examination given by the instructor in the special methods course involved.

FINE ARTS

Art:	To be selected from the following
*Art 21–22:	Design I: Basic
Art 23–24:	Fundamentals of Photography
Art 41–42:	Drawing I
Art 51–52:	Ceramics I
Art 57–58:	Graphics I
Art 65–66:	Painting I
Art 81–82:	Sculpture I
Art 123–24:	Design II: Individual Problems
Art 125–26:	Painting II
Art 127–28:	Painting III
Art 131–32:	Ceramics II
Art 137:	Workshop in Materials, Methods, and Techniques
Art 143–44:	Serigraphy
Art 151–52:	Ceramics III
Art 153–54:	Graphics II
Art 157–58:	Graphics III
Art 163–64:	Design: Visual Communication
Art 175–76:	Design Projects
Art 179–80:	Sculpture II
Art 181–82:	Intermediate Photography
Art 189–90:	Sculpture III
	Total

Biology†

B Sc 11–12:	Introductory Biology for Science Majors
B Sc 101:	Invertebrate Zoology, or
B Sc 104:	Comparative Vertebrate Anatomy
B Sc 108:	Organic Evolution, or
B Sc 127:	Genetics
B Sc 140:	General Ecology
B Sc 163:	Human Physiology
B Sc 164:	Human Physiology Laboratory
B Sc:	Advanced Botany courses as approved by the adviser
Chem 11–12:	General Chemistry
Phys 1:	General Physics
Phys 2:	Introduction to Modern Physics
	Total

Chemistry

‡Chem 11–12:	General Chemistry, or
Chem 15–16:	Intensive General and Analytical Chemistry
‡Chem 22:	Introductory Quantitative Analysis
Chem 151–52:	Organic Chemistry

* Art 21-22 or permission of Department Chairman is prerequisite to all other Fine Arts courses.
† Other courses recommended but not required—Chem 50, or 151-52 and 153-54; Math 31.
‡ Chem 22 required if Chem 11-12 is elected.

		Semester Hours
Chem 153–54:	Organic Chemistry Laboratory	2
Chem 110:	Introduction to Physical Chemistry, or	3
Chem 111:	Physical Chemistry	2
Chem 134:	Descriptive Inorganic Chemistry	2
Chem 191:	History of Chemistry	3
Math 6:	Plane Trigonometry	3
Math 30:	Precalculus	3
Math 31:	Calculus of One Variable	4
Phys 1:	General Physics	4
Phys 2:	Introduction to Modern Physics	
	Total	40–44

Earth Science

B Sc 3:	Introductory Biology for Nonscience Majors	3
Chem 11–12:	General Chemistry	8
Geol 14:	Field Petrology	3
Geol 21–22:	Physical and Evolutionary Geology	6
Geol 101:	History of Geological Sciences	3
Geol 122:	Structural Geology	4
Geol 125:	Marine Geology	3
*Math 3:	College Algebra	3
*Math 6:	Plane Trigonometry	3
Phys 1:	General Physics	4
Other Courses:	To be selected from the following as approved by the adviser	6–8
Anth 186:	Physical Anthropology of Modern Man	
Geol 128:	Geomorphology	
Geol 141:	Introductory Geochemistry	
Geol 147:	Chemical Geology in the Earth and Ocean Sciences	
Geol 151–52:	Invertebrate Paleontology	
Geol 163:	Sedimentation	
	Total	46–48

Elementary Education

Art:	As approved by the adviser	3
Econ 1:	Principles of Economics	3
Geog 51:	Introduction to Geography, or	
Geog 52:	Introduction to Economic Geography	3
Hist 71–72:	Introduction to American History	6
Math 9, 10:	General Mathematics I, II	6
Music:	As approved by the adviser	3
PE:	As approved by the adviser	3
†Science:	As approved by the adviser	9–12
Social Studies:	As approved by the adviser	6
	Total	42–45

* Additional mathematics is required for some advanced geology courses.
† The science requirement must include courses in both physical and biological sciences.

English

Engl 1 or 1x:	English Composition: Language as Communication
Engl 2:	English Composition: Language and the Arts and Sciences, or
Engl 4:	English Composition: Language in Literature
Engl 52:	Introduction to English Literature
Engl 71–72:	Introduction to American Literature
Engl 101:	Expository Writing
Engl 115:	Introduction to English Linguistics
Engl 127–28:	Shakespeare
Sp&D 11:	Voice and Diction
*Engl:	To be selected from the following as approved by the adviser
Engl 133–34:	The Romantic Movement
Engl 135–36:	Victorian Literature
Engl 137–38:	The 20th Century
Engl 153–54:	The English Novel
Engl 155–56:	The English Drama
Engl 161–62:	Studies in American Literature
Engl 163–64:	Major American Poets
Engl 165–66:	American Drama
Engl 167–68:	The American Novel
Engl 171–72:	Major American Writers
Engl 175–76:	Special Topics in American Literature
Engl 177–78:	Contemporary American Literature
	Total

French

Fren 9–10:	French Conversation and Composition, or
Fren 12:	French Conversation and Composition (Intensive)
Fren 51–52:	Survey of French Literature, or
Fren 91–92:	Analyse de texte
Fren 103:	Pronunciation and Intonation
Fren 108:	Cours avancé de grammaire
Fren 109–10:	Advanced French Conversation and Composition
Fren:	To be selected from the following
Fren 119–20:	French Literature of the Middle Ages and the Renaissance
Fren 121–22:	17th Century French Literature
Fren 123–24:	18th Century French Literature
Fren 125–26:	19th Century French Literature
Fren 127–28:	20th Century French Literature
Fren 193:	Cours de style
Other Courses:	Recommended from the following but not required
Art 109:	19th Century Art in Europe
Art 110:	Contemporary Art
Engl 115:	Introduction to English Linguistics
Foreign Lang:	Other than French as approved

* Not required for the minor teaching field.

		Semester Hours
Hist 141–42:	History of France	
Psyc 115:	Psychology of Language and Communication	
	Total	42–45

General Science*

B Sc 3–4:	Introductory Biology for Nonscience Majors	6
†Chem 11–12:	General Chemistry, or	8
Chem 15–16:	Intensive General and Analytical Chemistry	
†Chem 22:	Introductory Quantitative Analysis	4
Phys 1:	General Physics and	
Phys 2:	Introductory to Modern Physics, or	6–8
Phys 9–10:	Introduction to Astronomy	10
‡Science:	Additional courses as approved by the adviser	9
Math:	To be selected from the following	
Math 3:	College Algebra	
Math 6:	Plane Trigonometry	
Math 30:	Precalculus	
Math 31:	Calculus of One Variable	
Math 32:	Calculus of Several Variables	
Math 33:	Calculus of Vector Functions	
	Total	41–47

Geography

Geog 51:	Introduction to Geography	3
Geog:	To be selected from the following	21
Geog 103:	Cartography and Graphics	
Geog 125:	Transportation Geography	
Geog 126:	Economic Geography	
Geog 127:	Population and Settlement	
Geog 132:	Resources and Environment	
Geog 133:	Geography of Poverty and Hunger	
Geog 134:	Location of Industry	
Geog 140:	Urban Geography	
Geog 141:	Urban Settlement	
Geog 142:	Urban Environments and Systems	
Geog 144:	Environmental Adaptation	
Geog 145:	Cultural Geography	
Geog 146:	Political Geography	
Geog 161:	Latin America	
	Total	24

* May not be chosen as a minor teaching field.
† If Chem 11-12 is elected, it must be followed by Chem 22. If Chem 15-16 is elected, Chem 22 is not required; however, Chem 50 is recommended following Chem 16.
‡ Eighteen semester hours in one science field are required for certification.

German

		Sem. Hr.
Germ 9–10:	German Conversation and Composition	
Germ 51–52:	Introduction to German Literature	
Germ 179–80:	Advanced Conversation and Composition	
*German:	Additional courses as approved by the adviser	
	Total	

History

Hist 39–40:	European Civilization in Its World Context, or	
Hist 91–92:	World Civilizations	
Hist 71–72:	Introduction to American History	
Hist:	Research Seminar (see adviser, Department of History)	
Hist:	Six semester hours in each of three of the following groups as approved by the adviser	
*Hist:	Additional semester hours from any one of the following groups as approved by the adviser	
	Total	

GROUP 1: AMERICAN HISTORY

Hist 167:	American Colonial History
Hist 169:	The American Revolution
Hist 170:	U.S. Early National History
Hist 171–72:	U.S. Social History
Hist 173–74:	The Negro in American History
Hist 175–76:	U.S. Political History
Hist 177:	The Ante-bellum South
Hist 179–80:	U.S. Economic History
Hist 181–82:	U.S. Diplomatic History
Hist 183:	Oversea Expansion of the United States
Hist 185:	Representative Americans
Hist 186:	U.S. Urban History

GROUP 2: EUROPEAN HISTORY

Hist 108:	The Ancient Near East and Egypt to 600 A.D.
Hist 109:	Early Aegean and Greek Civilizations to 200 B.C.
Hist 110:	The Roman World to 455 A.D.
Hist 111–12:	Medieval History
Hist 113:	Early Middle Ages
Hist 121:	The Renaissance in Western Europe
Hist 131–32:	History of Germany
Hist 139–40:	World History in the 20th Century
Hist 141–42:	History of France
Hist 144:	History of Russia: Medieval to 1700
Hist 145:	History of Russia: 18th and 19th Centuries
Hist 146:	History of Russia: Soviet Russia
Hist 147:	Economic History of Europe

* Not required for the minor teaching field.

Hist 149–50:	European Diplomatic History
Hist 151–52:	History of England and Great Britain
Hist 153:	Tudor England
Hist 154:	Stuart England
Hist 157:	20th Century European Diplomatic History
Hist 158:	Modern Jewish History

GROUP 3: THE EASTERN WORLD

Hist 138:	History of World Communism
Hist 144:	History of Russia: Medieval to 1700
Hist 145:	History of Russia: 18th and 19th Centuries
Hist 146:	History of Russia: Soviet Russia
Hist 187:	History of Modern China
Hist 188:	History of Chinese Communism
Hist 193:	History of the Near East
Hist 194:	History of the Modern Near East
Hist 195–96:	History of East Asia

GROUP 4: LATIN AMERICAN HISTORY

Hist 161:	Revolution in 20th Century Latin America: the Mexican and Cuban Experience
Hist 163–64:	History of Latin America
Hist 165:	History of Brazil
Hist 166:	History of Mexico
P Sc 177:	Governments and Politics in Latin America
P Sc 178:	Latin America: Political Patterns and International Relations

Mathematics

		Semester Hours
Math 30:	Precalculus	3
Math 31:	Calculus of One Variable	3
Math 32:	Calculus of Several Variables	3
Math 33:	Calculus of Vector Functions	3
Math 121:	Introduction to Abstract Algebra	3
Math 124:	Introduction to Matrix Theory	3
Math 135:	Projective Geometry	3
*Math:	Three additional second- or third-group courses in Mathematics approved by the adviser	9
Stat 97:	Introduction to Computer Programming	3
Stat 157–58:	Introduction to Mathematical Statistics	6
	Total	39

Music

Mus 5–6:	Harmony	6
Mus 103–4:	History of Music	6
Mus 131–32:	Advanced Theory	6
Applied Music:	Voice or major instrument	6
Applied Music:	Minor instruments	6

* Not required for the minor teaching field.

		Semester Hours
Ensemble:	Choral or Orchestral	
Music Literature or Music Theory:	As approved by the adviser	
	Total	

Physics

Math 30:	Precalculus	
Math 31:	Calculus of One Variable	
Math 32:	Calculus of Several Variables	
Math 33:	Calculus of Vector Functions	
Phys 1:	General Physics	
Phys 2:	Introduction to Modern Physics	
*Phys 31–32:	Introduction to Theoretical Physics	
*Phys 51–52:	Introduction to Experimental Physics	
Phys 151:	Intermediate Laboratory	
Phys 163:	Physical and Quantum Optics	
Phys 164:	Thermodynamics	
Phys 167:	Principles of Quantum Physics	
	Total	

Russian

Slav 9–10:	Intermediate Russian Conversation and Composition	
Slav 91–92:	Introduction to Russian Literature	
Slav 125:	Russian Linguistic Structure	
Slav 126:	Contrastive Russian-English Analysis	
Slav 131:	18th Century Russian Literature	
Slav 141–42:	Russian Romanticism and Realism, or	
Slav 151:	Russian Symbolism, and	
Slav 152:	Russian Literature after the Revolution	
Slav 197:	Methodology of Teaching Russian	
†Slav:	Additional courses from the following as approved by the adviser	
Slav 101–2:	Readings in Modern Russian	
Slav 109–10:	Advanced Russian Conversation and Composition	
Slav 128:	Dostoevsky, the Man and the Artist	
Slav 143–44:	The Russian Novel	
Slav 146:	The Russian Short Story	
Slav 153:	Turgenev	
Slav 156:	Leo Tolstoy, His Life and Works	
Slav 157:	Nabokov	
Slav 158:	Solzhenitsyn	
Slav 161–62:	Russian Culture	
Slav 165:	Soviet Literature from the Revolution to World War II	

* Phys 31-32 and 51-52 will be offered for the last time during the academic year 1973-74. Students who have not begun these courses before the 1974 spring semester will take instead a new 12-semester-hour requirement—Phys 40, 41, and 42—and will take a total of 43 semester hours rather than 3
† Not required for the minor teaching field.

		Semester Hours
Slav 166:	Soviet Literature from World War II to the Present	
Slav 193–94:	The Other Slavs: Their Literature—in English	
	Total	39

Social Studies

Econ 1–2:	Principles of Economics	6
Hist 39–40:	European Civilization in Its World Context, or	6
Hist 91–92:	World Civilizations	6
Hist 71–72:	Introduction to American History	6
P Sc 4 or 5, 6:	Introduction to Political Science	6
Other Courses:	To be selected from the following	
Anth 1–2:	Introductory Anthropology	
Geog 51:	Introduction to Geography	
Geog 52:	Introduction to Economic Geography	
Soc 1:	Introductory Sociology	
Soc 2:	American Social Problems	
*Other Courses:	Second-group courses, as approved by the adviser, from Anthropology, Economics, Geography and Regional Science, History, Political Science, and Sociology	12
	Total	42

Spanish

Span 9–10:	Spanish Conversation and Composition, or	
Span 12:	Spanish Conversation and Composition (Intensive)	6
Span 51–52:	Survey of Spanish Literature and Civilization	6
Span 91–92:	Explicación de textos	6
Span 109–10:	Advanced Spanish Conversation and Composition	6
Span:	Two full-year courses selected from second-group Spanish or Spanish American Literature courses	12
Other Courses:	Recommended from the following	6
Engl 115:	Introduction to English Linguistics	
Foreign Lang:	Other than Spanish as approved	
Hist 161:	Revolution in 20th Century Latin America: the Mexican and Cuban Experience	
Hist 163–64:	History of Latin America	
Hist 165:	History of Brazil	
Hist 166:	History of Mexico	
Psyc 115:	Psychology of Language and Communication	
Span 193:	Curso de estilo	
Span:	Second-group courses in Spanish and Spanish American Literature not previously elected	
	Total	42

* Not required for the minor teaching field.

Special Education*

		Semester Hours
S Ed 101:	Seminar: Dimensions of the Complementary Teaching Role	
S Ed 102:	Teaching the Child with Special Needs: Methods and Materials	
S Ed 103:	Teaching the Child with Special Needs: Creative Programming	
S Ed 170:	Interpersonal/Intrapersonal Relationships for Teachers	
S Ed 189:	Preprofessional Internship: Observing the Special Child in the Regular Class Milieu	
S Ed 190:	Preprofessional Internship: Inspecting a Continuum of Special Education Services	
S Ed 199:	Internship in Complementary Teaching	
	Total	

Speech and Drama

Sp&D 1:	Communicative Speaking and Listening	
Sp&D 11:	Voice and Diction	
Sp&D 32:	Oral Interpretation of Literature	
Sp&D 101:	Acoustic Phonetics	
Sp&D 112:	Advanced Public Speaking	
Sp&D 121:	Group Discussion and Conference Leadership	
Sp&D 169:	Introduction to Creative Dramatics	
Sp&D 171:	Bases of Speech and Hearing	
Area of Specialization:	Selected from one of the following groups as approved by the adviser	
	Total	

GROUP 1: SPEECH COMMUNICATION†

Sp&D 126:	Argumentation and Debate
Sp&D 127–28:	Advanced Debate Practice
Sp&D 133–34:	Radio and TV Broadcasting
Sp&D 143:	Origins of Contemporary Rhetorical Theory
Sp&D 144:	History and Criticism of American Public Address

GROUP 2: DRAMA†

Sp&D 115–16:	Acting
Sp&D 151:	Stagecraft
Sp&D 152:	Advanced Stagecraft
Sp&D 154:	Play Directing
Sp&D 155–56:	Play Production Practice
Sp&D 165–66:	History of the Theatre

* Minor teaching field only. S Ed 102, 103, 170, 189, and 190 must be taken prior to the senior year.
† Not required for the minor teaching field.

ROFESSIONAL EDUCATION

he basic professional information, skills, and attitudes needed by beginning achers are provided through a sequence of courses to be taken in the junior nd senior years. Lectures and class discussions are closely coordinated with eld work. Instruction is differentiated to meet the needs of those preparing to ach on the various levels—elementary school, junior high school, senior high chool, and adult.

The prescribed courses in special methods are concerned primarily with ethods of initiating, guiding, and evaluating learning experiences dealing with he content of teaching fields. They attempt to bring to the student specific uggestions drawn from the accumulated experience of successful teachers. However, in addition, the courses review the teaching-field content currently n use in schools, and examinations at the end of courses provide the final test f competency in the teaching fields.

Professional Courses—Secondary

		Semester Hours
Educ 108:	Human Development, Learning, and Teaching	3
Educ 112:	Educational Measurement	3
Educ 123:	Society and the School	3
Educ 131:	Secondary School Principles and Methods	3
Educ 134:	Student Teaching in Secondary Schools	6–9
Special Methods:	Three to six semester hours from the following courses	3–6
Educ 136:	Teaching English in Secondary Schools	
Educ 137:	Teaching Speech	
Educ 138:	Teaching Social Studies in Secondary Schools	
Educ 139:	Teaching Art in Secondary Schools	
Educ 140:	Teaching Mathematics in Secondary Schools	
Educ 142:	Teaching Music in Secondary Schools	
Educ 144:	Teaching Science in Secondary Schools	
Educ 146:	Teaching Foreign Languages	
	Total	21–27

Professional Courses—Elementary

Educ 108:	Human Development, Learning, and Teaching	3
Educ 111:	Elementary School Curriculum and Methods	15
Educ 112:	Educational Measurement	3
Educ 123:	Society and the School	3
Educ 135:	Student Teaching in Elementary Schools	9
	Total	33

BACHELOR OF SCIENCE IN PHYSICAL EDUCATION

The curriculum, which is designed to prepare students for teaching in elementary and secondary school programs of physical education, offers opportunities for specialization in dance, elementary or secondary school physical education.

The student wishing to prepare to teach another subject in addition to p
cal education may use his elective hours to work toward a minor teaching
Relevant work in Columbian College may be counted.

PREREQUISITE

For the first two years of the Bachelor of Science in Physical Education
riculum, see Columbian College of Arts and Sciences, page 79.

CURRICULUM

Specialization in Dance

Junior and Senior Years

| | | Se
Ho |
|---|---|---|
| Educ 108: | Human Development, Learning, and Teaching | |
| Educ 112: | Educational Measurement | |
| Educ 123: | Society and the School | |
| Educ 134: | Student Teaching in Secondary Schools | |
| PE 109–10: | Dance Composition | |
| PE 117: | Techniques of Teaching Dance | |
| PE 134: | Rhythmic Theory for Dancers | |
| PE 135–36: | Dance History | |
| PE 141–42: | Dance Production | |
| PE 150: | Human Anatomy | |
| PE 151: | Kinesiology | |
| PE 164: | Physiology of Exercise | |
| PE: | Nine semester hours to be selected from the following | |
| PE 119: | Creative Dance for Children | |
| PE 120: | Repertory | |
| PE 129: | Introduction to Motor Learning | |
| PE 137: | Dance Notation | |
| PE 144: | Choreography | |
| Elective: | | |
| | Total | |

Specialization in Elementary School Physical Education

Junior Year

Educ 108:	Human Development, Learning, and Teaching
Educ 123:	Society and the School
PE 101:	Physical Education in the Elementary School
PE 102:	Movement Education
PE 103:	Professional Foundations and Concepts of Physical Education, Dance, Recreation, Health, and Athletics
PE 113:	Field Experience: Practicum in Physical Education
PE 130:	Motor Performance in Childhood
PE 138:	Physical Education Curriculum and Administration
PE 150:	Human Anatomy

		Semester Hours
PE 151:	Kinesiology	3
Elective:		3
	Total	33

Senior Year

Educ 112:	Educational Measurement	3
Educ 135:	Student Teaching in Elementary Schools	9
PE 114:	Field Experience: Practicum in Physical Education	3
PE 129:	Introduction to Motor Learning	3
PE 164:	Physiology of Exercise	3
Elective:		6
	Total	27

cialization in Secondary School Physical Education

Junior Year

Educ 108:	Human Development, Learning, and Teaching	3
Educ 123:	Society and the School	3
PE 103:	Professional Foundations and Concepts of Physical Education, Dance, Recreation, Health, and Athletics	3
PE 111–12:	Sports Education Technique	6
PE 113:	Field Experience: Practicum in Physical Education	3
PE 138:	Physical Education Curriculum and Administration	3
PE 150:	Human Anatomy	3
PE 151:	Kinesiology	3
Elective:		6
	Total	33

Senior Year

Educ 112:	Educational Measurement	3
Educ 134:	Student Teaching in Secondary Schools	6–9
PE 114:	Field Experience: Practicum in Physical Education	3
PE 129:	Introduction to Motor Learning	3
PE 164:	Physiology of Exercise	3
Elective:		9
	Total	27–30

Graduate Study

HE SCHOOL OF EDUCATION OFFERS GRADUATE PROGRAMS leading to the degrees f Master of Arts in Teaching, Master of Arts in Education, Education Special-t, and Doctor of Education.

GRADES

For graduate work, grades are indicated as *A*, Excellent; *B*, Good; *C*, Min
Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal; *CR*, Credit. Gra
B, *C*, and *F* are counted in computing the quality-point index (see pag

Whenever a grade has not been assigned, the symbol *I* (Incomplete)
symbol *W* (Authorized Withdrawal) will be recorded. The symbol *I* ind
that a satisfactory explanation has been given to the instructor for the stu
failure to complete the required work of the course. An "Incomplete"
be made up after the lapse of one calendar year except by written permiss
the Dean's Council. An "Incomplete" which is not removed within one ca
year is automatically changed to an *F*. An "Incomplete" cannot be remov
reregistering for the course.

THE DEGREE OF MASTER OF ARTS IN TEACHING

The School of Education offers an intensive fifth-year program design
prepare selected graduates of accredited liberal arts colleges for teachi
elementary schools. Successful fulfillment of the program's requirements
vides the professional courses necessary for certification as an eleme
teacher. Students may receive the degree of Master of Arts in Teachi
completion of the program or receive credit for 15 semester hours of gra
work toward the degree of Master of Arts in Education.

For details, write to the Chairman of the Department of Education, M
Program, School of Education, George Washington University, Washi
D.C. 20006.

ADMISSION TO THE PROGRAM

To be admitted as a student-intern, an applicant must (1) have a Bachelor'
gree from an accredited liberal arts institution, including courses related to
general education requirements for teacher certification; (2) show evidenc
interest in children and a sincere desire to teach; (3) submit three written r
ences attesting to quality of academic record and personality; (4) submit a s
on the Aptitude Test of the Graduate Record Examination or the Miller An
gies Test; and (5) be interviewed by the University Selection Committee, or
der arrangements specified by the Committee and approved by the Dean of
School of Education.

PLAN OF STUDY

Beginning with a six-week summer session, the program includes a Septem
experience with full-time study in the fall semester. Course work during
time is planned to help each student gain understanding of (1) the characte
tics of elementary school children, (2) the subject-matter areas of the eleme
tary school curriculum, (3) basic dimensions of teaching methodology, (4)
relationship between educational theory and methods, (5) educational tests
measurements, and (6) the role of the school in American society.

During the fall semester, students will be given full-time student teaching
signments in a nearby public school. This part of the program will permit

ent to use, in an actual teaching situation, the educational theories and
ods which he has been studying.
n internship during the spring semester in one of the cooperating school
ems in the area may provide the student an opportunity to assume the re-
sibilities of a beginning teacher, with the help and guidance of University
public school staff members. Seminar meetings will be scheduled weekly
discussion of common problems and for cooperatively planned work on in-
dual and group needs of interns. Each student plans, conducts, and reports
an action research project.

THE DEGREE OF MASTER OF ARTS IN EDUCATION

grams of study leading to the degree of Master of Arts in Education are
igned to enable prospective teachers and teachers of experience to increase
ir knowledge of professional and academic information and skills and pre-
e for special types of educational service. They also provide opportunities for
lege graduates in other disciplines to acquire needed professional education,
well as study in the subjects which they are planning to teach.
From the various related departments of the University, the student and his
viser select courses to give the student an adequate background in his chosen
d of service. Programs for teachers-in-service and experienced teachers plan-
g to re-enter the profession are differentiated from those for students without
ching experience.

Master's programs are available in the following fields:

dult Education
llege Student Development
rriculum
rly Childhood Education
ementary Administration
ementary Education
uidance
igher Education
uman Resource Development
hysical Education (candidates may specialize in adaptive physical education, dance, elementary or secondary school physical education, therapeutic recreation, tourism and development, or urban recreation administration)
Reading
Rehabilitation Counseling
Secondary Administration
Secondary Education
Special Education (candidates may specialize in crisis/resource teaching, diagnostic-prescriptive teaching, or early childhood special education)
Supervision and Human Relations

For teachers interested in developing or strengthening their academic com-
etence, the elementary and secondary education fields normally permit 15
o 18 semester hours of work in departments other than education. These
rograms are designed to meet the needs of teachers-in-service who need addi-
ional work in content to qualify for advanced certification or to improve their
lassroom skills; and may also be helpful to previously trained teachers plan-
ing to re-enter the profession. The major emphasis is upon strengthening both
he academic and professional competencies of the teacher.
Additional information concerning these programs may be obtained by
writing or telephoning the Office of the Dean.

ENTRANCE REQUIREMENTS

A Bachelor's degree from an accredited institution, an undergraduat point index of 2.50 or above (C + average), demonstrated interest ing, and personality traits that give promise of better-than-average suc teacher, are required.

Two years of successful teaching are required before admission to c in the fields of guidance and school administration. Experience is req admission to programs in Adult Education and Human Resource ment.

ADMISSION TO CANDIDACY

Candidates whose undergraduate preparation does not include equiva the basic requirements for the degree of Bachelor of Arts in Educati make up deficiencies and may be required to take designated tests.

ADVANCED STANDING

For the record, advanced standing is granted for approved courses other accredited institutions, but a minimum of 30 semester hours completed at this University as a Master's candidate.

A maximum of 12 semester hours of advanced courses completed University in excess of the requirements for the Bachelor's degree credited toward the Master's degree if the work fits in with the studen of specialization.

Advanced standing is not granted for work completed five or mo before application for admission or readmission to Master's candidacy

REQUIREMENTS FOR THE DEGREE

PLAN OF STUDY

The plan of study leading to the degree of Master of Arts in Education a minimum of 33 hours of graduate credit. The plan may, at the stude tion, include a thesis carrying 6 hours of graduate credit. Whether or no dent selects the thesis option, a minimum of 18 hours, including a co educational research methods and procedures, must be from courses primarily for graduate students (third-group courses). A minimum of not including the thesis or the research course, must be from courses o the School of Education.

Programs may include additional teaching-field preparation. In su however, undergraduate and graduate courses combined must be at leas lent to the undergraduate requirements for the degree of Bachelor of Education (see pages 108-19).

Programs are planned initially in conference with an admission advis Office of the School of Education and subsequently with a designated a the candidate's area of specialization. These programs are based on the of the candidate, his previous background, and the certification require the state and locality in which the candidate plans to teach.

All degree requirements must be completed within a period of six

IDENCE

andidate for the Master's degree is required to complete satisfactorily 30 ester hours in residence in the School. With the approval of the adviser, 9 he 30 hours may be off-campus courses in the College of General Studies.

IOLARSHIP

quality-point index of 3.00 is required for graduation. Students who re- e the grade of *C* in more than 6 semester hours are subject to suspension. dents who receive a grade of *F* must confer with the Dean of the School of ucation before enrollment for further work.

THESIS

choice of the thesis subject must be approved in writing by the student's ad- r and filed in the Office of the Dean. A statement of the School of Educa- standards for the thesis and printed copies of detailed regulations regarding form and reproduction of the thesis are available in the Office of the Dean. ayment of tuition for the thesis entitles the candidate, during the period of istration, to the advice and direction of the member of the faculty under om the thesis is to be written. In case a thesis is unfinished, an additional ndar year may be granted without further tuition payment. The student st, however, maintain continuous registration (see page 47) during this pe- . If the preparation of the thesis extends beyond the additional calendar r, the student must register for the entire 6 hours of thesis again and pay ion as for a repeated course.

STER'S COMPREHENSIVE EXAMINATION

ddition to the course examinations, the candidate must pass a special three- r examination on his area of specialization. Candidates for the examination t be registered for the semester it is to be taken, and must file a written ap- ation in the Office of the School of Education no later than thirty days prior he date of the examination.

THE DEGREE OF EDUCATION SPECIALIST

School of Education provides a program of advanced study leading to degree of Education Specialist for students with Master's degrees in Educa- who seek further professional preparation for specific objectives.

RANCE REQUIREMENTS

degree of Master of Arts in Education from this University (or the equiva- , a satisfactory score on the Miller Analogies Test or the Graduate Record nination, and two years of successful pertinent experience, are required.

ISSION TO CANDIDACY

applicant must be interviewed and recommended by a staff member of the

School of Education or by a representative in the candidate's locality a
by the Dean.

SCHOLARSHIP

Scholarship requirements for the degree of Education Specialist are the
those for the degree of Master of Arts in Education (see page 125).

PROGRAMS OF STUDY AND DEGREE REQUIREMENTS

Individual programs are developed, through the faculty-adviser plan, t
candidates' abilities, interests, needs, and career goals. A minimum
semester hours beyond the requirements of the degree of Master of
Education at this University is required. At least 21 hours of this work
taken on campus at this University; with the approval of the adviser,
maining semester hours of the program may be taken in off-campus
of the College of General Studies or at another approved university.
mum of five calendar years is allowed for completion of the program.

At least 12 of the required 30 hours must be in appropriate graduate
in Education selected from the following areas: (1) foundations and
study, (2) background and general principles of the field of study, (3)
of specialization.

THE COMPREHENSIVE EXAMINATION

Successful completion of a six-hour written examination and/or
examination, at the option of the major field adviser, is required.

THE DEGREE OF DOCTOR OF EDUCATION

The School of Education offers programs of advanced study leading
degree of Doctor of Education. These programs, which are under the
vision of the Advanced Graduate Faculty, provide major fields of
teacher education, special education, counselor education, administrat
curriculum, and adult and higher education. Supporting fields are
in administration, administration of higher education, adult education,
student development, counselor education, curriculum, elementary ed
higher education, human growth and development, human resource
ment, reading, secondary education, special education, supervision, and
education. With the approval of the Advanced Graduate Faculty and
partments concerned, one supporting field may be taken in other depa
of the University. All programs require study of interrelated areas of
tion and a doctoral dissertation in the major field of study.

ADMISSION

The applicant must have adequate preparation for advanced study, in
graduate work in fields prerequisite to his objective equivalent to that
for the degree of Master of Arts in Education at this University, at lea
years of successful pertinent educational experience, acceptable persona
ties, and a capacity for creative scholarship and effective leadership.

The applicant first arranges for an interview with the Assistant Dean for ad-
ced graduate studies to explore his needs in relation to the resources of the
ool and to guide him in his application for doctoral study. The required
nission procedures and standards will be explained at this time. Candidates
eting the initial standards are admitted to precandidacy for the degree.

ECANDIDACY

the precandidacy period a minimum of 12 semester hours of course work
the program, including requirements specified by the Advanced Graduate
culty, must be completed. Application for full candidacy will then be de-
ed on the basis of the quality of scholarship in the precandidacy period, the
ommendations of instructors, a detailed plan for the balance of the pro-
m, and a qualifying examination.

AN OF STUDY

general, from two to three years of full-time study beyond the degree of
ster of Arts in Education, or the equivalent in part-time study, are required.
grams are individually planned. It is estimated that, for the average student,
work required for the total program will be 75 semester hours, including
inimum of 12 semester hours of dissertation research.

Each program is divided into two parts. The first consists of preparation for
mprehensive examinations in a major field of study and three supporting
lds, including a required research tool field. The second is composed of re-
arch investigation, the writing of a dissertation, and the final oral examination.
Students who have completed the comprehensive examinations and who were
t registered for doctoral study under the payment plan in effect prior to July
1967, must register for a minimum of 6 semester hours of Dissertation Re-
arch (491) a semester until 12 hours have been completed, and a minimum
3 semester hours a semester thereafter until the satisfactory completion of
e final examination.

OMPREHENSIVE EXAMINATIONS

hen the student is admitted to doctoral candidacy, he is assigned to a commit-
, each member of which is responsible for guiding him in his preparation
r one of the required comprehensive examinations in supporting fields or the
mprehensive major field examination. The candidate must arrange indi-
dual conferences with the committee members to determine the content of
ch field and to receive guidance in his preparation for the examination.
The supporting field examinations, which are taken first, are three-hour written
aminations. In addition to the research tool field a student who plans a his-
rical research investigation for his dissertation must complete an appropriate
search seminar offered by the Department of History. The student's Dis-
rtation Committee may recommend other tool requirements. The tool re-
irement must be completed prior to the major field examination. The ma-
r field examination is a written twelve-hour examination, six hours on each
two successive days.

The candidate begins the second part of his program after the satis
completion of all supporting field examinations, the required research to
and the major field examination.

THE DISSERTATION

A dissertation is required as evidence of ability to perform scholarly r
and to interpret and present its results.

During the first part of the program, the Dean appoints a Dissertatio
mittee, consisting of a major adviser as Director, usually the major field
and two additional faculty members who serve as readers. The candida
quired to submit a proposal for his dissertation to this Committee, whic
mines its acceptability and recommends approval to the Committee
vanced Graduate Studies. The dissertation is completed under the dire
the Dissertation Committee.

No later than the date specified in the calendar, the candidate must su
the Dean three complete copies of the dissertation and two copies of
stract for inclusion in the announcement of the examination and for re
tion by University Microfilms, Inc. Printed copies of detailed regulat
garding the form and reproduction of the dissertation, preparation of
stract, and services offered by University Microfilms, Inc., are available
Office of the Dean. The successful candidate for the doctorate is re
before receiving his degree, to pay a fee to cover the expense of printi
Announcement of the Final Examination, and for the basic service re
by University Microfilms, Inc.

THE FINAL EXAMINATION

When the dissertation has been accepted, the Director recommends the
date to the Dean for the final oral examination, which must be passed
three weeks before the degree is to be conferred. The examination is
the public and is conducted by a committee of the Faculty, appointed
Dean, supplemented by at least two leaders in the candidate's field o
from outside the University. Candidates who successfully pass the oral
nation are recommended for the degree by the Faculty of the School of
tion.

RESIDENCE AND CONTINUOUS STUDY

All the preparation for the degree, including examinations and work oth
courses and seminars, which is done under the direction of an adviser,
done in residence. The student must remain registered in the School of
tion, except when the Dean or the Advanced Graduate Faculty has gr
leave of absence. Failure to register each semester of the academic ye
result in lapse of candidacy. Subsequent readmission is subject to w
new conditions and regulations have been established by the Advanced
uate Faculty.

The supporting and major field examinations must be completed wit
years of the date of admission, and the entire program must be co
within eight years, regardless of full-time or part-time study. All can
must satisfy one of three options for full-time study. Information con

se plans will be provided by the Assistant Dean for Advanced Graduate dies upon request by the candidate.

Special Programs and Services

UCATION OF TEACHERS OF EXCEPTIONAL CHILDREN

E SCHOOL OF EDUCATION offers a program for the education of teachers of ceptional children. Laboratory experiences are arranged in schools for handi- pped children in the metropolitan area. Students are accepted at the junior- senior-year undergraduate, Master's, Education Specialist, and Doctoral els. By special permission, teachers, school administrators, and adequately pared students from other schools and colleges of the University may elect se courses.

Inquiries concerning the program and the availability of scholarships and lowships should be directed to Dr. Perry Botwin, Department of Special ucation, George Washington University, Washington, D.C. 20006.

ADUATE PROGRAM IN REHABILITATION COUNSELING

e School of Education offers a federally funded Master's degree program the preparation of rehabilitation counselors. These professional personnel ist persons who are disabled or disadvantaged to assume a proper place in iety. The two-year program combines fieldwork with course work in prepar- students for immediate employment in an expanding field that yields high manitarian and financial rewards. Both the profession and the program are erdisciplinary, drawing upon such related areas as guidance, medicine, psy- ology, social work, sociology, and special education.

Traineeships, including tuition and stipends, are available for full-time stu- nts. Information and applications are available from Dr. Daniel Sinick, habilitation Counselor Education, Department of Education, George Wash- gton University, Washington, D.C. 20006.

ADUATE SPECIALIZATION IN THERAPEUTIC RECREATION AND APTIVE PHYSICAL EDUCATION

e School of Education offers a federally funded Master's degree program in field of physical education with a specialization in therapeutic recreation or aptive physical education. This program is funded by the Bureau of Educa- n for the Handicapped, U.S. Office of Education. Both programs require intensive internship (minimum of 510 clock hours) in University affliated ining centers in Washington area hospitals, schools, clinics, and public encies. Inquiries concerning this program and the availability of graduate search assistantships and internships should be directed to Dr. Donald E. awkins, Department of Physical Education, Health, and Recreation, George ashington University, Washington, D.C. 20006.

RTIFICATION CURRICULA

e School of Education provides individually planned programs for liberal arts

graduates with appropriate degrees who wish to prepare for teaching seeking certification, but not wishing to work for a degree, may enr certification program if they meet the admission, scholarship, and pe requirements of degree candidates. The School also provides a wide r courses of interest to teachers who wish to renew licenses.

READING CENTER

(See page 52.)

OFF-CAMPUS DEGREE PROGRAMS

The School of Education has academic jurisdiction over the off-camp grams leading to the degree of Master of Arts in Education in the elementary administration; elementary education; higher education; resource development; secondary administration; secondary education, education—crisis/resource teaching, diagnostic-prescriptive teaching childhood special education; and supervision and human relations.

These degree programs are administered by the College of General S For details concerning the off-campus programs see the *College of Studies* Catalogue.

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION

Dean Peter Vaill
Associate Dean R.L. Holland

FACULTY*

fessors Frederick Amling, Guy Black, Louis Block *(Visiting)*, H.F. Bright, .S. Brown, D.R. Cloutier, J.C. Dockeray, R.B. Eastin, R.F. Ericson, Leon intzig, P.D. Grub, J.L. Jessup, E.J.B. Lewis, G.L. Lippitt, A.J. Mastro, D.C. IcGrath, Jr., H.R. Page, Ben Posner *(Visiting)*, D.D. Roman, R.C. Sedwick, dwin Timbers, Peter Vaill, M.M. Wofsey

ociate Professors R.A. Barrett, R.R. Bonato *(Research)*, S.R. Chitwood, I.C. Devolites, S.F. Divita, Rodney Eldridge, P.L. Foster, S.S. Fuller, M.G. allagher, Sherwin Greene, W.W. Hardgrave, M.M. Harmon, Jerry Harvey, .L. Holland, F.C. Kurtz, G.P. Lauter, Norma Loeser, E.R. Magruder, J.F. IcCarthy, Jr., Chei-Min Paik, P.N. Reeves, J.R. Roman, Jr., T.E. Shaughessy, S.N. Sherman, W.E. Smith, E.K. Winslow

unct Associate Professors H.C. Demoody, Nina Woodside

istant Professors Elizabeth Adams, Irwin Dubinsky, R.F. Dyer, W.H. Guy *Research)*, John Lobuts, Jr., D.B. Rasmussen, V.T. Velasco, J.W. Waldrip *ructors* D.F. Bergwall, Patricia Cleary *(Research)*, R.A. Oliver, R.G. Shouldce, Richard Switalski *(Research)*

MMITTEES†

N'S COUNCIL

lney Eldridge, S.S. Fuller, M.G. Gallagher, M.M. Harmon, Peter Vaill, M. Wofsey

MMITTEE ON CURRICULUM

. Holland *(Chairman)*, Frederick Amling, S.R. Chitwood, H.C. Demoody, Fuller, A.J. Mastro, P.N. Reeves

---

e President of the University, the Vice President for Academic Affairs, the Registrar of the ersity, the Director of Admissions of the University, and the University Librarian are ex officio bers of the Faculty of the School of Government and Business Administration.
e Dean of the School is an ex officio member of all committees.

COMMITTEE ON DOCTORAL STUDIES IN BUSINESS ADMINISTRATION AND PUBLIC ADMINISTRATION

M.M. Wofsey (*Chairman*), D.S. Brown, Rodney Eldridge, S.S. Fulle
Gintzig, Jerry Harvey, A.J. Mastro

ADVISORY COUNCIL*

The School of Government and Business Administration Advisory
operates as an advisory group on policy, finance, and community re
It consists of responsible members of the business and government co
ties, and of the faculty, administrators, and students of the School.

CHAIRMAN

Leo M. Bernstein, *President, District of Columbia National Bank*

MEMBERS OF THE COUNCIL

Frederick Amling, *Professor of Business Finance*
Everett H. Bellows *(University Trustee), Vice President of the Was*
Office, Olin Corporation
Louis Block, *President, Block, McGibony & Associates, Inc., Silver Spri*
C. Robert Boucher, *President, C. Robert Boucher & Company, Inc., W*
ton, D.C.
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Carl William Clewlow, *Deputy Assistant Secretary of Defense for Civili*
sonnel Policy, Department of Defense
Sheldon Stanley Cohen, *Cohen and Uretz*
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Joseph Hennage, *President, Hennage Creative Printers, Washington, D.C*
Arthur A. Morris, M.D.
Kenneth Mulligan, *Consultant*
Jerauld L. Olmsted, *Vice President, Intermediate Credit Corporation*
Charles Emory Phillips *(Chairman of the University's Board of Trustees),*
man of the Board, Equitable Life Insurance Company, Washington, D
Daniel David Roman, *Professor of Management Science*
Maurice H. Schwartz, *Assistant Controller for Information Systems,*
Atomic Energy Commission
Douglas R. Smith, *(University Trustee), President, National Savings &*
Company, Washington, D.C.

* The President of the University, the Chairman of the Board of Trustees, the Vice Pre
Academic Affairs, the Vice President for Development, and the Dean of the School of G
and Business Administration are ex officio members of the Council.

eph H. Taggart, formerly *Dean, Graduate School of Business Administration, New York University*
bert P. Thome, *Comptroller, The Washington Post Company, Washington, D.C.*
bert L. Tull, *Vice President, Security Storage Company, Washington, D.C.*
mes Otis Wright (*University Trustee*), *Corporate Director, Sea Island, Ga.*

UDENT MEMBERS OF THE COUNCIL

ewellyn A. Brown, Rory M. Carson, David J. Gallitano

INTRODUCTION

his school was organized as the School of Government in 1928. During the ext two decades, programs in business administration and public administraon were added, and the emphasis gradually shifted from undergraduate to raduate study. The name was changed in 1960 to the School of Government, usiness, and International Affairs to reflect more accurately the offerings of e School. A division of the School was effected in 1966, and two schools ere established—the School of Government and Business Administration, a imarily professionally-oriented school; and the School of Public and Internaonal Affairs, a primarily policy-oriented school.

BJECTIVES

he principal objective of the School of Government and Business Administraion is to prepare its graduates for positions in the management of complex oranizations in both business and government. The degree programs are deigned to prepare students both for *entrance* into business and government and or *advancement* to high-level management positions.

Programs in the School include examination of administrative principles and uantitative approaches to decision-making common to both business and govrnment. These programs stress the points at which major policy decisions of ither business or government must give consideration to related policy decions of the other. Emphasis is placed on the fact that management education s not limited to organizational techniques but is, in the broadest sense, educaion for management responsibility.

It is the policy of the School to emphasize a broad fundamental education as the best preparation for positions carrying management or administrative esponsibility.

Undergraduate programs concentrate the first two years in a broad liberal arts urriculum drawn from the social sciences, humanities, quantitative methods, nd a limited number of courses in administration. Students in the junior and enior years expand their work to include (1) the functions of business enterprise, (2) the economic and legal environment of business, (3) the implications of modern analytical techniques based on quantitative methods, (4) the study of organization theory and human relations, and (5) the practice of problem-solving techniques.

Graduate programs develop the elements common to all management positions regardless of the nature of the operation. Master's degree programs are

based on study of the principles of management, human relations, an
lem-solving plus an area of specialization.

Responsive to the needs of the Washington community, the School
lowed the policy of making many of its educational activities available
campus centers in and around the metropolitan area of Washington.
campus work leads to a degree carrying a different designation; thus, the
lor of Business Administration degree on campus has a substantial equi
to the Bachelor of Science in Administration degree offered off campus
ties furnished by government or business organizations. The Master of
Administration, Master of Public Administration, Master of Urban and
Planning, and Master of Arts in Government degrees are offered on
while the Master of Science in Administration degree is the only grad
gree offered off campus. The off-campus programs have strong suppor
area and provide significant contact with the business and governme
munities.

SUMMARY

In order to provide students with a common body of knowledge of bus
governmental administration, programs include the equivalent of at le
year of work comprising the following areas:

1. In the case of business enterprise, a background of the concepts, p
and institutions in marketing and distribution, production, and financi
tions; in the case of governmental administration, a background of co
processes, and institutions of planning, programming, budgeting, person
tices, and policy formulation in government.

2. A background of the economic and legal environment of busi
government enterprise, along with consideration of the social and poli
fluences on business.

3. A basic understanding of the concepts and methods of accounting
tative methods, and information systems.

4. A study of organization theory, interpersonal relationships, con
motivation systems, and communications.

5. A study of administrative processes under conditions of uncerta
cluding the integration of analysis and policy determination at the over-a
agement level.

ACADEMIC STATUS

The School of Government and Business Administration has maintain
membership in the Middle Atlantic Association of Colleges of Business
istration since 1961. It joined the Council on Graduate Education for
Administration in 1966. By invitation, in 1968, the School became a
academic member of the American Association of Collegiate Schools o
ness Assembly. The programs in Public Accounting designed to prep
dents for Certified Public Accountants examinations have been approved
state boards of New York and Maryland. The program in Hospital A
tration is accredited by the National Accrediting Commission on
Education for Hospital Administration.

REGULATIONS

gulations concerning ADMISSION, REGISTRATION, FEES AND FINANCES *are ed on pages 21-33; other University regulations, on pages 43-51.*

TENDANCE

student may not attend classes until registration is completed and fees due paid. A student may be dropped from any course for undue absence.
The student is held responsible for all the work of the courses in which he is istered, and all absences must be excused by the instructor in charge before vision is made for him to make up the work missed.
A student suspended for any cause may not attend classes during the period suspension.

THDRAWAL

thdrawal from a course or from the University without academic penalty is mitted during the first four weeks after registration for the fall or spring nester. Withdrawal after this period is permitted only in unusual circumnces, and requires certification by the instructors of courses for which the dent is registered that he is doing passing work (see "Withdrawal," pages 46).

DING COURSES

urses may not be added after the first full week of classes in any semester or mmer session.

DEPENDENT STUDY PLAN

student of *demonstrated capacity*, with a special interest in the subject matter a course, may be permitted to undertake study under the personal direction an instructor, in accordance with the rules of the appropriate department. edit under this plan is limited to the specific course credits normally allowed en taken on a class basis.

The Bachelor of Business Administration Degree

E SCHOOL OFFERS PROGRAMS leading to the degree of Bachelor of Business dministration in the fields of Accounting and Business Administration.

ENTRANCE REQUIREMENTS

od character and an academic background appropriate for the program of dies contemplated are required.
Requirements for admission to the freshman class are as follows:
1. An acceptable certificate of graduation from an accredited secondary

school, showing at least fifteen units* which must include four years of
at least two years of one foreign language; two years of science, pr
with laboratory instruction; two years of social studies, one of which
American history; and two years of college preparatory mathematics.
of algebra, or the equivalent, is prerequisite to courses in chemistry
tistics; and one unit in algebra and one unit in plane geometry, or the
lent, are prerequisite to courses in mathematics and physics.

2. The principal's statement that the applicant is prepared to undert
lege work.

3. College Entrance Examination Board scores submitted on the Sc
Aptitude Test and the English Composition Achievement Test.

It is recommended that the examinations be taken in December or J
Scores on tests taken in the junior year may be submitted. Arrangeme
tests are the responsibility of the applicant and should be made with th
cational Testing Service, 20 Nassau Street, Princeton, N.J. 08540;
Center Street, Berkeley, Calif. 94704, not less than one month before
of the test. In applying for the test, the applicant should specify that th
be sent to the Office of Admissions, George Washington University, W
ton, D.C. 20006.

The College Entrance Examination Board tests are preferred; howev
American College Testing battery scores will be accepted. The ap
should request that these scores be sent to the Office of Admissions
from the American College Testing Program, Iowa City, Iowa. It is
mended that the applicant take the tests in October of the senior year.

The School of Government and Business Administration will consi
adequacy of the qualifications of an applicant who, because of unusual
stances, does not present all of the formal requirements stated abov
School may prescribe appropriate scholastic-aptitude tests of the Univ

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Students transferring from other colleges and universities as junior
offer an acceptable broad-based liberal arts program, or equivalent.
case will more than 60 semester hours of advanced standing be grant
course work completed at a 2-year or junior college. Accounting and B
Administration courses taken at accredited 2-year colleges may be appl
ward the Bachelor of Business Administration degree provided they a
parable to this School's courses numbered *under* 100. Courses compar
B Ad 161, Mgt 118, 119, or Stat 97 will also be acceptable. Other course
at accredited 2-year colleges which are comparable to Accounting and B
Administration courses numbered from 101 to 200 will not be acceptabl
validated by the student completing advanced courses at this School
same fields.

REQUIREMENTS FOR THE DEGREE

ACADEMIC WORK LOAD

A full-time student not on probation may not ordinarily take more th
semester hours. A student employed more than 24 hours a week, who

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* A unit represents a year's study in a secondary school subject, including in the aggregate
than 120 sixty-minute periods, or the equivalent, of prepared classroom work.

on probation, may not take more than 9 semester hours.

A full-time student whose quality-point index is 3.50 or higher may not take more than 18 semester hours. A student employed more than 24 hours a week, whose index is 3.50 or higher, may take up to 12 semester hours.

A student who accepts employment after registration or at any time during a semester must report immediately to the Dean, so that his program may be adjusted if necessary.

Exception to these rules will require the approval of the Dean.

SCHOLARSHIP

In order to graduate, a student must have the following: (1) a general quality-point index of at least 2.00 and (2) an index in his major of at least 2.50. The major includes the required courses and courses taken in the group options.

DEAN'S HONOR LIST

The names of students who achieve a quality-point index of 3.50 or higher are placed on the Dean's Honor List for that semester. Appearance on the list will be limited to (1) full-time students registered for a minimum of 12 semester hours and (2) part-time students registered for a minimum of 12 semester hours over a period of two consecutive semesters, which may include a summer term.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized Withdrawal) may be assigned are described on page 44.

Removing an Incomplete.—The grade of *I* must be removed no later than the last day of the examination period for the fall or spring semester immediately following the semester or summer session in which the grade of *I* is assigned. An "Incomplete" that is not removed within this period is automatically changed to an *F*. In cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the Dean, or the appropriate committee, for additional time in which to complete the work of the course. Such petitions should be submitted within the same period. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere.

PROBATION

A student whose quality-point index falls below 2.00 after completing a minimum of 12 semester hours of study will be placed on probation. This probation extends over the period in which the student attempts 12 semester hours of work, which may include remedial studies as prescribed.

SUSPENSION

A student whose quality-point index is 1.50 or below or whose index remains below 2.00 at the end of his probationary period may be suspended. A student suspended for poor scholarship may apply for readmission after the lapse of either the fall or spring semester. To be considered for readmission, he must pass prescribed tests and submit evidence to the Dean's Council that during his

absence from the University he has so conducted himself as to indicate t will profit by readmission. A student readmitted after suspension is on tion and must maintain a current quality-point index of at least 2.50 on ea semester hours of work undertaken until his cumulative index is 2.00. case will the probationary period after readmission exceed 24 hours of A student suspended twice for poor scholarship will not be readmitted.

CREDIT/NO CREDIT OPTION

A junior or senior student who has a cumulative quality-point index of 2 better, may, with the approval of his adviser and the Dean, take one co semester and receive a grade of *CR*, Credit, or *NC*, No Credit, which will corded on the student's transcript but will not be reflected in his quality index. No student will be allowed to take more than 4 credit/no credit co A student must sign up for such an option at registration. Under no cir stances may a student change from credit/no credit status to graded stat vice versa, after the end of registration. Courses required in the student's jor field may not be taken on the credit/no credit basis. A transfer student not choose this option until the second semester of his enrollment in this versity.

RESIDENCE

A minimum of 30 semester hours, including at least 12 hours in the major must be completed while registered in the School of Government and Bu Administration. This requirement applies to students transferring within University as well as to students transferring from other institutions. Su work may be counted toward the residence requirement, but in no case ma period of residence aggregate less than thirty weeks. Unless special permi is granted by the Dean to pursue work elsewhere, the work of the senio final year must be completed in the School of Government and Business ministration.

USE OF CORRECT ENGLISH

Any student whose written or spoken English in any course is unsatisfa may be reported by the instructor to the Dean. The Dean may assign su mentary work, without academic credit, varying in amount with the need the student. If the work prescribed is equivalent to a course, the regular fee is charged. The granting of a degree may be delayed for failure to up such deficiency in English to the satisfaction of the Dean.

CORRESPONDENCE AND HOME-STUDY COURSES

Credit for correspondence or home-study courses is not acceptable and ca be applied toward a degree.

EARNING CREDIT OR WAIVING REQUIREMENTS BY EXAMINATION

A student may earn credit up to a maximum of 30 semester hours or curricular requirements by performing satisfactorily on the following tes

College-Level Examination Program (CLEP).—CLEP offers two types of examinations: (1) CLEP Subject Examinations—offered in 29 subject areas. These tests measure achievement in the equivalent of specific college-level courses. (Duplicate credit—by passing the examination and by passing the equivalent course—is not permissible.) (2) CLEP General Examinations—offered in five areas: Mathematics, Social Sciences, Humanities, the Natural Sciences, and English Composition. (Credit—advanced standing—is not given for the General Test in English Composition.) To be eligible to take the CLEP General Examinations, a student must have been out of school for three years or more.

Advanced Placement Tests.—See page 23.

Achievement Tests.—See page 24.

Examinations for Waiving Curriculum Requirements.—A required course may be waived by the satisfactory passing of a waiver examination authorized and prescribed by the department or curriculum adviser concerned. Passing this examination does not entitle the student to any hours of credit toward the degree. Request to take the examination should be made to the curriculum adviser and the required fee paid at the Office of the Cashier before the date set for the examination.

CURRICULUM REQUIREMENTS

One hundred and twenty semester hours of course work are required for graduation. To be recommended by the Faculty for graduation, candidates are required to complete, in addition to the appropriate freshman and sophomore work, a minimum of 60 semester hours in the junior and senior years selected from one of the two major field curricula offered by the School.

Curriculum for the First Two Years in Accounting and Business Administration

Freshman Year

		Semester Hours
Acct:	Acct 1–2	6
Econ:	Econ 1–2	6
Engl:	Engl 1 or 1*x*, 2	6
Science:	B Sc 3–4 or 11–12; Chem 3–4 or 11–12; Geog 51 and 52; Geol 1–2; or Phys 1 and 2, 3 and 4, or 9–10	6–8
*Elective:	Courses other than in Accounting, Business Administration, or Economics	4–6
	Total	30

Sophomore Year

B Ad:	B Ad 51	3
Humanities:	Art 31–32 or 71–72; Asia 3–4; Engl 51–52, 71–72, or 91–92; Fren 3–4 or 6, or 51–52; Germ 3–4 or 51–52; Ital 3–4 or 51–52; Mus 3 and 4; Slav 3–4, 5–6, or 91–92; Span 3–4 or 6, or 51–52; or Sp&D 1 and 11 (Accounting	

* Courses in Physical Education, Health, and Recreation may not be taken for credit.

	majors may postpone this requirement until the junior year if they wish to take Acct 121 or 191 in the sophomore year)
Math:	Math 31 and 32, or 51 and 52
Social Studies:	Psyc 1, 8
	Anth 1–2, Hist 71–72, P Sc 4 and 6 or 5 and 6, or Soc 1 and 2
Stat:	Stat 51
	Total

Accounting Major

Junior Year

Acct 101:	Cost and Budgetary Control
*Acct 121:	Intermediate Accounting
Acct 161:	Federal Income Taxation
*Acct 191:	Advanced Accounting
B Ad 102:	Fundamentals of Management
B Ad 131:	Business Finance
B Ad 141:	Basic Marketing Management
B Ad 161:	Commercial Law: Contracts, Sales, Agency, Bailments
Mgt 119:	Computer Programming for Information Systems
Elective:	Selected from courses other than in Accounting, Business Administration, or Economics
	Total

Senior Year

Acct 132:	Accounting Theory
Acct 171:	Auditing
Acct 181:	Accounting Systems
B Ad 101:	The Business Environment
B Ad 181:	Manufacturing Production
B Ad 198:	Business Policy and Administration
Econ 121:	Money and Banking
Stat:	Three semester hours selected from the following
Stat 111:	Business and Economic Statistics I
Stat 155:	Introduction to Probability
Stat 187:	Theory of Sampling
Elective:	Three semester hours selected from courses in Accounting, Business Administration, or Economics, and three semester hours selected from courses in other departments
	Total

* If Acct 121 and 191 are elected in the sophomore year, students replace this requirement semester hours of Humanities (see pages 139-40).

NORMAL SCHEDULE FOR ACCOUNTING COURSES

Junior Year: Fall—Acct 101, 121 (if not elected in sophomore year), 161; Spring—Acct 191 (if not elected in sophomore year), 161 (if not elected in Fall).

Senior Year: Fall—Acct 171; Spring—Acct 132, 181.

Three semester hours of Accounting may be taken as an elective in either the junior or senior year.

ACCOUNTING PRACTICE INTERNSHIP

An internship in accounting practice is open to Accounting majors during the semester break of the senior year. Students will be paid a salary while conducting audits under senior supervision of participating C.P.A. firms. Other internships with industry and government are available. The general requirements are at least 15 semester hours of Accounting courses, including a course in auditing, with a 2.85 or higher average and an over-all grade average of 2.50 or higher. For further information consult A.J. Mastro, Chairman of the Department of Accounting, George Washington University.

Business Administration Major

The program in Business Administration is designed to provide the broad foundation required for eventual top leadership in either governmental or business administration. It consists of the 36 semester hours of *required* courses; 15 hours* in one of the following group options; and 9 hours of electives, normally advanced courses in liberal arts subjects.

Junior Year

		Semester Hours
Acct 193:	Business Budgeting	3
B Ad 102:	Fundamentals of Management	3
B Ad 105:	Personnel Management	3
B Ad 131:	Business Finance	3
B Ad 141:	Basic Marketing Management	3
Mgt 118:	Introduction to Information Processing	3
Group Option:	Nine semester hours selected from the chosen area of specialization (see pages 142–44)	9
Elective:	To be selected in consultation with the adviser	3
	Total	30

Senior Year

B Ad 101:	The Business Environment	3
B Ad 161:	Commercial Law: Contracts, Sales, Agency, Bailments	3
B Ad 181:	Manufacturing Production	3
B Ad 198:	Business Policy and Administration	3

*Students who choose the group option in International Business are required to take only 12 semester hours of courses in that group if they have received credit for two years of modern foreign language, or the equivalent.

		Sem. Hr.
Econ 121:	Money and Banking	
Psyc 144:	Personnel and Industrial Psychology	
Group Option:	Six semester hours selected from the chosen area of specialization (see below)	
Elective:	To be selected in consultation with the adviser	
	Total	

GROUP OPTIONS

Eight areas of specialization are open to Business Administration majors. 15 hours taken in each of these options require the approval of the adviser. group option and the individual courses within the option should be selecte *the beginning of the junior year.* The student should contact the Chairma the Department of Business Administration for assignment of an adviser.

GROUP I: ECONOMICS

The following courses provide the basic academic foundation for such position financial economic analyst, industrial economic analyst, and market research an in business and government.

B Ad 132:	International Business Finance
B Ad 133:	Capital Formation
B Ad 176:	International Business Theory and Policy
*Econ 101:	Intermediate Microeconomic Theory
*Econ 102:	Intermediate Macroeconomic Theory
Econ 158:	Industrial Organization
Econ 161, 162:	Public Finance I, II
Econ 181–82:	International Economics
Stat 111, 112:	Business and Economic Statistics I, II

GROUP II: FINANCE

The following courses provide the basic academic foundation for such position credit analyst, supervisor in a financial institution, bond cashier, trust officer, b examiner, and similar positions in federal or international financial institutions.

*Acct 111:	Financial Statement Analysis
Acct 121:	Intermediate Accounting
B Ad 113:	Real Estate
B Ad 121:	Fundamentals of Insurance
B Ad 122:	Insurance Estate Planning
B Ad 132:	International Business Finance
B Ad 133:	Capital Formation
*B Ad 138:	Investment and Portfolio Management
Econ 101:	Intermediate Microeconomic Theory

GROUP III: INFORMATION PROCESSING

The following courses provide the basic academic foundation for positions in formation processing in government, business, and industry. They also give student an understanding of the manager's use of information processing as a managerial technique.

* Required for this group option.

*Mgt 119: Computer Programming for Information Systems
*Mgt 120: Information Systems Development I
*Mgt 121: Information Systems Development II
*Mgt 122: Special Studies in Information Systems
One additional 3-semester-hour course approved by the adviser

GROUP IV: INTERNATIONAL BUSINESS

The following courses provide the basic academic foundation for positions in international business, both in private industry and in government. Students in this option who have received credit for two years of a modern foreign language, or the equivalent, are required to take only 12 semester hours from the following courses.

*B Ad 132: International Business Finance
*B Ad 144: International Marketing Management
B Ad 175: Introduction to Foreign Trade
B Ad 176: International Business Theory and Policy
*B Ad 178: International Business Policy and Operations
Econ 181–82: International Economics

GROUP V: MARKETING

The following courses provide the basic academic foundation for such positions as sales manager, marketing manager, product development manager, research director, buyer, advertising director, sales promotion manager, and credit manager.

*B Ad 143: Marketing Research
B Ad 144: International Marketing Management
*B Ad 145: Sales Management
B Ad 147: Advertising
B Ad 158: Physical Distribution Management
B Ad 171: Principles of Transportation
B Ad 175: Introduction to Foreign Trade
B Ad 178: International Business Policy and Operations

GROUP VI: PERSONNEL MANAGEMENT

The following courses provide the basic academic foundation for such positions as personnel manager, employee relations manager, and employment manager in business and government service.

*B Ad 106: Problems in Personnel Management
*B Ad 107: Collective Bargaining
Jour 145: Principles and Problems of Public Relations
Psyc 129: Theories of Personality
Psyc 131: Psychological Tests
Sp&D 121: Group Discussion and Conference Leadership

GROUP VII: STATISTICS

The following courses provide the basic academic foundation for such positions as financial statistician, planning statistician, industrial statistician, and rate analyst in business and government.

Stat 91: Principles of Statistical Methods
Stat 110: Quality Control and Reliability Techniques
*Stat 111, 112: Business and Economic Statistics I, II

* Required for this group option.

Stat 117:	Analysis of Variance
Stat 118:	Regression Analysis
Stat 155:	Introduction to Probability
Stat 157–58:	Introduction to Mathematical Statistics

GROUP VIII: TRANSPORTATION AND LOGISTICS

The following courses provide the basic academic foundation for management
tions in transportation firms and in traffic departments of other types of bu
firms and government agencies. The program should also aid in the preparatio
the examinations for membership in the American Society of Traffic and Tra
tation.

B Ad 158:	Physical Distribution Management
*B Ad 171:	Principles of Transportation
B Ad 172:	Public Utilities
*B Ad 173:	Transportation Systems Management
B Ad 174:	Urban Transportation
B Ad 175:	Introduction to Foreign Trade
CE 183:	Urban Planning
Geog 125:	Transportation Geography

The Master's Degrees

Master of Business Administration.—The degree of Master of Busines
ministration is this School's top professional Master's degree in business.
designed to develop the analytical ability and perspective which will contr
to success as a responsible executive. Because of the increasingly close rela
ship between government and business, the programs for this degree also
vide an excellent background for many government careers.

Master of Arts in Government.—Washington, D.C., is uniquely situated
students of public administration. Public figures, professional governmen
ministrators, and specialized libraries are resources readily available to
School's programs in public administration. The degree of Master of Ar
Government is designed for graduate students who are seeking an educatio
entry into the federal service in an administrative capacity, or who wish to
phasize the academic elements of public administration. This program, like
Master of Public Administration and Master of Business Administration
programs, provides several fields of concentration, such as operations res
urban and regional planning, or behavioral factors in administration,
which the candidate may select for in-depth education.

Master of Public Administration.—The School of Government and Bu
Administration is located in the midst of a vast complex of governmen
government-related activities which are local, regional, national, and int
tional in scope. This location provides a living laboratory of public admi
tion for study and access to a unique concentration of working expertise in
lic administration. The Master of Public Administration degree provid
course of study particularly appropriate for those in the government servi

* Required for this group option.

a professional degree, preparing graduates for positions of higher responsi-
ility in the public service and generally improving their competence in public
mployment. Several elements of the program are taken in common with offer-
ngs in the Master of Business Administration degree program. Work done for
his degree may lead directly toward the degree of Doctor of Public Administra-
ion.

Master of Arts in Health Care Administration.—This professional degree
s designed as an alternative to the degrees of Master of Business Administration
nd Master of Public Administration in the field of Health Care Administration.
tudy in depth may be made in various aspects of Health Care Administration
ound in short-term hospitals, long-term health facilities (such as extended-care
nstitutions, nursing homes, mental hospitals, facilities for the aged), group
ractice clinics, health information systems, and comprehensive health planning
gencies.

Master of Urban and Regional Planning.—This professional planning degree
s designed as preparation for careers on the municipal, county, state, and na-
ional levels. The program of study is planned to provide a broad professional
ducation, to develop competence in planning and methodology, and to em-
hasize the analytical ability and creativity necessary for solving urban and
egional problems.

Master of Science in Administration.—The Master of Science in Administra-
ion degree is offered only off campus. It provides a course of study appropriate
or those students currently working in government and business. It is a pro-
essional degree, preparing graduates for higher positions and greater respon-
ibility and generally improving their competence as administrators.

ENTRANCE REQUIREMENTS

A Bachelor's degree from an accredited college or university that includes at
east 90 semester hours of academic work, with a quality-point index of 3.00
a *B* average) in the relevant undergraduate field, is required.

Students who lack sufficient undergraduate study in business or related fields
ay be required to make up these deficiencies by taking specified undergraduate
ourses and maintaining a 3.00 average in those courses.

Applicants for admission to programs leading to the degree of Master of Busi-
ess Administration must submit acceptable scores on the Admission Test for
raduate Study in Business; applicants for admission to programs leading to the
egrees of Master of Arts in Government, Master of Arts in Health Care Ad-
inistration, Master of Public Administration, and Master of Urban and Re-
onal Planning must submit scores on the Admission Test for Graduate Study
Business *or* the Graduate Record Examination. It is the responsibility of the
pplicant to make arrangements for the required test with the Educational Test-
g Service, Princeton, N.J. 08540. Correspondence concerning the Admission
est for Graduate Study in Business should be addressed to Box 966; concern-
g the Graduate Record Examination, to Box 955.

GENERAL REQUIREMENTS

program of greater length, including undergraduate background courses, may

be assigned for an applicant whose undergraduate degree was in a fie
than the graduate program he wishes to follow, or whose undergraduate
indicates a weakness in required background courses.

Master's degrees are awarded by vote of the Faculty on completion
required course work, an acceptable thesis (if one is elected or required)
equivalent work, and the passing of the Master's Comprehensive Exam
An applicant whose background does not include the necessary course
take a program longer than the minimum hours required.

Second-group courses (numbered 101-200) may be counted toward th
ter's degree only when registration for graduate credit has been approved
time of registration by the Dean and the curriculum adviser. No work c
toward a Bachelor's degree may also be counted toward a Master's degr

Full-time students are normally expected to register for 9 to 12 se
hours each semester. A graduate student who is employed more than 20
a week may not take more than 6 semester hours. All work for a Maste
gree must be completed in five years, unless an extension of time is gran
the Dean. Continuous registration does not serve the purpose of extend
student's degree candidacy beyond the five-year time limit.

A student who expects to continue his studies for the degree of Doc
Business Administration or Doctor of Public Administration after receiv
Master's degree should ask for assistance in planning his program so
may qualify for admission to candidacy for the Doctorate.

No credit is granted for work done *in absentia* or without formal instru
except for hospital residency, supervised field experience, and the thesis,
may be completed *in absentia* with the permission of the department, c
lum adviser, or committee concerned.

MASTER'S COMPREHENSIVE EXAMINATION

In addition to individual course examinations the candidate must pass a
written Master's Comprehensive Examination. In writing the examinati
student is expected to correlate what he has learned in his course work a
reading in the literature of his fields. The examination normally require
seven to nine hours writing time. Sections broadly cover the various fi
which the candidate has prepared himself.

The examinations are scheduled three times a year, in December, Apr
July, and should be taken during the last semester of course registrati
shortly after completion of the prescribed course work. The student must
completed all core requirements before being eligible to take the exami
If there is a lapse of time between completion of course work and the tak
the examination, the student must maintain continuous registration and
registered for the semester or summer session in which the examina
taken.

The candidate should consult with his adviser, well in advance, as to the
of his examination and the definition of the subject-matter fields which
amination is to cover. A written application is filed with the department
vising the student's elective field of study no later than 30 days prior to
amination date. Before applying for the examination, the student must
completed all of the courses in his program or be enrolled in his last sem
and he must have achieved a 3.00 (*B*) average. After applying for the

tion, a candidate may withdraw only by notice in writing to his Department hairman.

A candidate who fails the examination may, in exceptional circumstances d with specific approval of his advisers, repeat the examination, but only er the lapse of one semester and the undertaking of additional preparation as escribed. *If he fails a second time, no further opportunity to take the examiation will be permitted.*

HOLARSHIP

rades for graduate work are *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, il; *I*, Incomplete; *W*, Authorized Withdrawal; and *CR*, Credit.

An average of *B* or better is required for the Master's degree. The grade of *C* not considered as failing but must be counter-balanced by a grade of *A* in a aduate course of equal status.

A Master's degree candidate who receives a grade of *F* is required to present use for consideration by the Dean's Council as to why he should be allowed continue his studies toward a degree objective.

COMPLETE/AUTHORIZED WITHDRAWAL

nditions under which the grades of *I* (Incomplete) or *W* (Authorized Withawal) may be assigned are described on page 44.

Removing an Incomplete.—The grade of *I* must be removed no later than last day of the examination period for the fall or spring semester immediately llowing the semester or summer session in which the grade of *I* is assigned. n "Incomplete" that is not removed within this period is automatically changed an *F*. In cases of well-documented extenuating circumstances, an instructor d a student may jointly petition the Dean, or the appropriate committee, for ditional time in which to complete the work of the course. Such petitions ould be submitted within the same period. The grade of *I* cannot be removed reregistering for the course here, or by taking its equivalent elsewhere.

QUIRED COURSES IN ADMINISTRATION (Certain Fields)

e following courses in general administrative theory and practice are *required* all candidates for the degree of Master of Business Administration and Mas- of Public Administration.

		Semester Hours
Mgt 201:	Advanced Administrative Management	3
Mgt 204:	Quantitative Factors in Administration	3
Mgt 207:	Human Behavior in Organizations	3

n addition, each student is normally required to take, from the following up, the course appropriate to his specific area of concentration:

		Semester Hours
Acct 276:	Management Planning and Control	3
B Ad 257:	Operation of the Multinational Firm	3

B Ad 297: Business Policy Formulation
HCA 206: Case Studies in Health Care Administration
P Ad 214: Policy Analysis in Public Administration, or
P Ad 260: Policy Formulation and Administration

THE THESIS

Students contemplating doctoral study are strongly urged to include th as a part of their Master's program. The thesis subject should be sele early as possible so as to permit effective integration with the course

The subject must be approved by the professor in charge of the student The thesis in its final form must have the approval of the professor in and must be presented to the Dean by the student no later than the nounced in the calendar. Printed copies of detailed regulations regard form and reproduction of the thesis are available in the Office of the

Payment of tuition for the thesis entitles the candidate, during the two ters he registers for thesis (299–300), to the advice and direction of the ber of the Faculty under whom the thesis is to be written. In case a unfinished, an additional successive academic year is granted without tuition payment. The student must, however, maintain continuous regi during this period. If the preparation of the thesis extends more than th mesters beyond the date he registers for thesis 300, the student must regi the entire 6 hours of thesis again and pay tuition as for a repeated cours

OPTIONAL MASTER'S PROGRAM WITHOUT A THESIS

A thesis is required in certain degree programs and optional in others. programs where a thesis is optional and the student elects not to write student must take a course in research methodology and one other elective

MASTER OF BUSINESS ADMINISTRATION

Curricula leading to the professional degree of Master of Business Adm tion incorporate the recognized common core of instruction in business istration, the required courses in administration (see pages 147-48), elective field of concentration planned in consultation with a faculty Elective fields normally comprise 9 to 21 semester hours of an in student's program.

An applicant must have a Bachelor's degree from an accredited co university.

The degree is awarded by vote of the Faculty upon satisfactory passing Master's Comprehensive Examination, and the submission of an acc thesis if one is required. The complete program consists of 60 semester A student who has completed an undergraduate major in accounting or ness administration with a good record *may qualify* under a minimum able graduate credit program of 36 semester hours. No more than 6 h graduate course credits can be transferred from other accredited insti and each transfer of credit must be approved by the Dean.

The Master's Comprehensive Examination may not be taken before the last
mester of course work.

IELDS OF CONCENTRATION

CCOUNTING

he field of concentration in Accounting is designed to provide a contemporary, road-based academic preparation which will apply equally to the fields of accounting in government, industry, and public practice as well as to the field of eneral administration employing accounting as an effective means of understanding the organization.

A common body of knowledge in business administration is required of all andidates in this program. This knowledge may be obtained as part of an undergraduate degree (see pages 135-44) in business or as a part of the total Master of Business Administration program.

EHAVIORAL FACTORS IN ADMINISTRATION

he curriculum in this program reflects the assumption that the effective utilition of the behavioral sciences is concerned with both means and ends; that e specialist in behavioral science not only is skilled in theory and research but so applies his technical and specialized knowledge as a conscious force in effective organizational growth and improvement. Thus, courses are designed to quip the student with organizational concepts and behavioral skills appropriate optimizing the utilization of a system's total resources.

This program is designed to fulfill the need for professionals capable of degning, creating, and developing the necessary behavioral and organizational stems appropriate to rapidly changing societies. Emphasis is on the interrelaonships of such dimensions as motivation, leadership, problem-solving, organitional growth, and increased complexity of modern organizations and their fect upon the functions of organizational development.

USINESS-GOVERNMENT RELATIONS

his field of concentration provides a knowledge and understanding of the total siness environment essential to business policy formulation and execution; ves a keener appreciation of the role and function of business in a free enterise society, its environmental needs for optimum effectiveness, and what govnment can and should contribute to that environment; familiarizes students th successful techniques by which the content and direction of public policy ward business can legally be influenced; and provides students with a thorough owledge of current government policies toward business, contemporary issues fecting government-business relations, and possible solutions to problems in is area.

This field serves the needs of students of the business environment at the aster's and Doctoral levels and is based on the premise that the enormous inence of government on business and vice-versa—exercised in the roles of gulator, customer, supplier, protector, and competitor—will become even ore pervasive and that business policy formulation and execution and business cision-making will become increasingly dependent upon thorough knowledge

and understanding of the total environment of business and, most impo
of government policies, programs, and laws affecting business.

FINANCE AND INVESTMENTS

The field of concentration in Finance and Investments prepares stude
careers in finance and investments, providing a background in business
ing, controllership, treasury, long-range planning, reporting, and financi
agement processes. Courses are designed to emphasize the planning,
implementation, and controls necessary for making effective financial de
Instruction not only applies to manufacturing and trading enterprise but
dition, includes railroad and public utility financing. Each, however,
tinctive operating features. Most financial dogmas have a universality th
across business lines, and variations are more a matter of degree than a
substantive difference.

HEALTH CARE ADMINISTRATION

The programs in Health Care Administration lead to the degrees of M
Arts in Health Care Administration, Master of Business Administratio
Master of Public Administration. The majority of students begin their
in the fall semester of each year. However, a limited number of qualif
dents may be admitted to begin their course work in the spring semes
summer sessions. The basic curriculum for the degree of Master of
Health Care Administration is developed in keeping with the backgrou
professional goals of each student and ordinarily consists of a minimum
semester hours. The basic curriculum for the Health Care Administrati
centration leading to the degrees of Master of Business Administrat
Master of Public Administration ordinarily consists of a minimum of
mester hours. Undergraduate courses in Accounting, Economics, and St
are required as a prerequisite for all of these degree programs. Ma
Business Administration degree candidates must also complete selected
foundation courses.*

Ordinarily full-time students can expect to complete the on-campus pha
the degree program in two to four semesters over a period of one to tw
demic years. The total time depends on past academic course work
perience in the health care field.

Hospital Administration.—The program in Hospital Administration is
into two phases. During the first phase the student must complete a satisf
academic program of course work, selected in accordance with his backg
and needs. These courses cover the general and technical background of
tal administration, general administrative theory and practice, and proble
ing in the area of management as it relates to short-term hospitals. The
phase is a period of either on-the-job residency† under qualified admini
supervision or supervised field experience, for which the student receives
9 semester hours of academic credit. A written major report is required
of phase two. The length of the residency is dependent upon the area o
centration and the individual student's needs.

* Required foundation courses for Master of Business Administration degree candidates
Commercial Law, Marketing, Finance, Production, and Mathematics (calculus to the first var
† In selected cases, a combined residency can be arranged in more than a single concentrati

Administration of Long-term Care Facilities.—The concentration in Administration of Long-term Care Facilities is designed to prepare students for the ministration of facilities for the aged, extended-care facilities, and mental spitals.

During the first phase the student must complete a satisfactory academic proam of course work, selected in accordance with his background and needs. ese courses cover the general technical background of hospital administran, general administrative theory and practice, and problem-solving in the nagement of long-term care facilities. The second phase is a period of either -the-job residency* under a qualified administrative supervisor or supervised d experience, for which the student receives up to 9 semester hours of acamic credit. A written major report is required as part of phase two. The gth of the residency is dependent upon the area of concentration and the ividual student's needs.

Health Information Systems.—The concentration in Health Information Sysns recognizes the rapidly growing demand for individuals who can develop d implement the use of computer-based information systems in decision-mak approaches. It is designed to prepare those who wish to supervise and coinate data collection, processing, and retrievable activities for health care mplexes.

During the first phase the student must complete a satisfactory academic proam of course work, selected in accordance with his background and needs. ese courses cover the general and technical background of hospital administion and general administrative theory and practice. In addition required urses in computer services and information handling must be included. The ond phase consists of supervised field experience. A written major report is quired as part of phase two.

FORMATION TECHNOLOGY

e field of concentration in Information Technology is designed to provide a nagerial understanding of the principles of manual, mechanical, and elecnic information processing, including computer programming concepts, thods, and languages; an appreciation of the capabilities, limitations, and ection procedure of information processing equipment; a knowledge of all ases of management information systems development, implementation, and luation; and an understanding of the roles of both management and systems sonnel in information technology. It also provides an appreciation of the e of information technology as a tool of management.

Students actually participate in the development of management information tems; in the selection of computer equipment; and in the installation, manement, and evaluation of management information systems—during class sions.

TERNATIONAL BUSINESS

e field of concentration in International Business is designed to prepare stuts for careers in firms operating on a multinational basis or about to enter international field; for careers in the federal government and in international

* selected cases, a combined residency can be arranged in more than a single concentration.

agencies concerned with business, industry, and finance abroad; and Commerce option of the Foreign Service Officer Examination.

This program is also designed to provide foreign students with th ground and skills necessary to promote international business, and to them for careers in foreign and domestic firms within their own count for commercial officer positions within their governments.

Each student's program is individually developed by the student's ad cording to the student's background and interests.

MANAGERIAL ECONOMICS

The field of concentration in Managerial Economics is the study of ec institutions and analytical methods, taken from the point of view of bus governmental management. Its purpose is to develop (1) a broad und ing of the tools of economics; (2) an analytical power with respect to facets of an organization's activity or multi-organizational areas of speci est; (3) a skill in problem-oriented applications of economic tools; (4) ity to interpret historical development and predict future trends in firms tries, and economies; (5) a familiarity with the institutional setting of ec activity; and (6) an appreciation of the economic reasoning behind pub cies.

With a strong orientation to the economic problems of organizatio field of concentration is based on the methodology of general economics it supplements with the methods of management science.

Managerial economics presumes skills in quantitative methods, statist intermediate-level general economics. It is offered in a sequence tha mences with courses based on microeconomic and macroeconomic tools tively.

MARKETING

The field of concentration in Marketing encompasses all phases of supp demand, from procurement and materials handling to product presentati distribution. A student may concentrate in several subfields: marke search, sales management, advertising, retailing, and international marke addition, study may be complemented with courses from fields such as pology, geography, journalism, mathematics, psychology, sociology, and

OPERATIONS RESEARCH AND SYSTEMS ANALYSIS

The field of concentration in Operation Research and Systems Analy velops a thorough understanding of quantitative or mathematical approa problems of managerial control and decision-making. While the progr develop a competent background in basic mathematical theory associate the various techniques, it is oriented toward applications of the tech rather than their theoretical mathematical content.

PERSONNEL MANAGEMENT

Personnel Management is concerned with all aspects of the employ human resources in business organizations. It is a challenging field— and rapidly growing in scope and importance. Career opportunities are

omestic and international business organizations, hospitals, trade associations, esearch and educational institutions, and local, state, and federal government gencies. Courses encompass all phases of the recruitment, selection, employ- nent, and development of people, industrial relations, unionism, collective bar- aining, labor relations, and manpower utilization.

ROCUREMENT AND CONTRACTING

The field of concentration in Procurement and Contracting responds to the rec- gnized need for greater professionalism and sophistication among those en- aged in procurement activities of the federal government and in contracting ctivities of vendors to the federal government.

The sustained increase in federal purchasing—in volume, variety, and com- lexity—places ever greater demands upon the skill and resourcefulness of pro- urement and contracting personnel. The field has therefore been designed with he following objectives: (1) to provide a broad professional education in the nowledge and skills necessary for success in this field; (2) to develop in the tudent increased ability in analysis, decision-making, and communication; (3) o increase the student's appreciation of the economic, social, legal, and tech- ological consideration present in procurement and contracting activity.

ESEARCH AND DEVELOPMENT: POLICY AND MANAGEMENT

The field of concentration in Research and Development: Policy and Manage- nent explores the many aspects of technology relating to and influencing re- earch and development management, business, and public policy. The employ- nent of "state-of-the-art" technology and the creation of new technology hrough research and development are important processes in the achievement f the objectives of both private firms and governments.

The research and development environment has many unique operational haracteristics. The program of graduate study in this concentration has been esigned to identify and study the problems associated with managing creative rofessional people in a dynamic technology. As a contextual area, the pro- ram stresses the need for students to undertake original and meaningful re- earch involving political, economic, sociological, and operational problems en- ountered by management in industrial, governmental, and military research nd development organizations.

RANSPORTATION

he field of concentration in Transportation is concerned with both private and ublic planning and the management of a viable transport system which will est serve the needs of the nation and its industries within a competitive frame- ork. It is an integral function of all levels of government as well as of every nit of industry throughout the nation.

MASTER OF PUBLIC ADMINISTRATION

urricula leading to the professional degree of Master of Public Administration e available in the fields of Health Care Administration, Personnel Manage- ent, Public Administration, and Urban and Regional Planning.

PUBLIC ADMINISTRATION

This program of study is particularly appropriate for those students cur in governmental service who are seeking professional advancement in careers. The Master of Public Administration degree is a professional d preparing graduates for policy and managerial responsibilities in the p service and generally improving their competence in public management. done for this degree may also serve as a basis for further work leading t degree of Doctor of Public Administration.

The degree is awarded by vote of the Faculty upon the candidate's factorily completing course requirements and passing the Master's Compr sive Examination. The basic academic program requires 39 semester h (This may be slightly higher for specific options.) The thesis is optiona candidates, however, must successfully complete a 3-semester-hour cour research methods.

All undergraduate degree backgrounds are regarded as qualifying fo mission to this degree program. No more than 6 semester hours of gra credit can be transferred from other accredited institutions, and transfe credit must be approved by the Dean.

All students must fulfill the requirements of the field of Administr Theory and Practice (12 semester hours of *required* courses, see pages 147 The student must select as a second field Public Policy and Administr (either General—15 semester hours, or Metropolitan—15-18 semester ho The third field will be selected from the following (9 semester hours u otherwise indicated): Budgeting and Finance (12 semester hours), P Personnel Administration, Urban and Regional Planning, Metropolitan ministration (12 semester hours), Development Administration, Interna Management, Behavioral Science, Information Technology and Systems A agement, Health Care Administration, Procurement Administration, Res and Development Administration.

HEALTH CARE ADMINISTRATION

The programs in Health Care Administration are described on pages 15 and lead to the degree of Master of Arts in Health Care Administration, M of Business Administration, or Master of Public Administration.

PERSONNEL MANAGEMENT

The program in Personnel Management leads to the degree of Master of P Administration (if elective emphasis is directed toward Public Administrati to the degree of Master of Business Administration (if elective emphasis i rected toward Business Administration), or to the degree of Master of Ar Government.

The course work must include the *required* courses in administration (f 147-48). Each individual student's program is arranged in consultation wi curriculum adviser.

URBAN AND REGIONAL PLANNING

The program in Urban and Regional Planning is designed to provide an in duction to planning theory and methodology for students who are working

ward the degree of Master of Public Administration. The standards for the program are similar to those for the Public Administration curriculum outlined on page 154. The student is expected to include public administration, federal or metropolitan, as an integral part of his studies. With the counseling of an adviser, each program is individually planned in accordance with the interest and goal of the student.

MASTER OF URBAN AND REGIONAL PLANNING

The program of graduate study in Urban and Regional Planning leads to the professional planning degree of Master of Urban and Regional Planning. It is designed as preparation for careers on the municipal, county, state, and national levels, and for private professional practice. The course of study is designed to provide a broad professional education, to develop competence in planning and methodology, and to emphasize the analytical ability and creativity necessary for solving urban and regional problems. Each student's program is designed in consultation with an assigned faculty adviser in accordance with his individual career plans.

The degree is awarded by vote of the Faculty after satisfactory completion of (1) from 45 to 60 semester hours of course work, depending upon the background and experience of each individual student, including a thesis equivalent to 6 semester hours (most students will ordinarily be required to take 60 semester hours); (2) a minimum of three months' full-time professional training in a planning agency under qualified supervision, with an acceptable written report to be submitted after completion of the training period; (3) a written Master's Comprehensive Examination; and (4) a thesis based on the candidate's research in the field of urban and regional planning.

MASTER OF ARTS IN GOVERNMENT

Curricula leading to the degree of Master of Arts in Government are available in the fields of Personnel Management, Public Administration, and Urban and Regional Planning.

The programs leading to this degree require a minimum of 39 semester hours of work.

PERSONNEL MANAGEMENT

The program in Personnel Management leads to the degree of Master of Arts in Government, to the degree of Master of Business Administration (if elective emphasis is directed toward Business Administration), or to the degree of Master of Public Administration (if elective emphasis is directed toward Public Administration).

PUBLIC ADMINISTRATION

In contrast to the Master of Public Administration degree, the Master of Arts in Government degree with a major field in Public Administration is designed for students who wish to emphasize the academic elements of public or inter-

national administration. It also serves as a basis for later study toward a doctor degree. This degree requires a basic 39 semester hours of course work. Certa options, however, may require more hours.

The student will be expected to qualify in three fields of study. All of thos except candidates in International Management must meet the requirements i the field of Public Policy and Administration (15 semester hours). A secon major field may be selected from the following: Financial Management (1 semester hours), Public Personnel Administration (9 semester hours), Metro politan Administration (12 semester hours), Health Care Administration (1 semester hours). The third field may be chosen from the options listed under th Master of Public Administration degree program (see page 154). Certain cours combinations are suggested. Those in Metropolitan Administration, for exampl may wish also to undertake work in Urban and Regional Planning, and those in Public Personnel Administration may wish to take work in Personnel Man agement and Human Behavior, for which special provisions are made. Those students who elect the field of International Management are expected to qualify in American Administration Systems (15 semester hours), Comparative and Developmental Administration (9 semester hours), International Business Management (12 semester hours).

All undergraduate degree backgrounds are regarded as qualifying for ad mission to this degree program.

The thesis is optional. All students will be expected to take a course in re search methods. Comprehensive examinations in each of the fields selected must be successfully passed.

URBAN AND REGIONAL PLANNING

The program in Urban and Regional Planning leading to the degree of Master of Arts in Government is designed to provide planning theory and methodology for students who have an undergraduate degree in the social sciences. The stu dent is expected to include public administration, federal or metropolitan, as an integral part of his studies, as well as courses in urban planning and design or regional planning. Under the counseling of an adviser, each program is individ ually planned in accordance with the interest and goal of the student.

MASTER OF ARTS IN HEALTH CARE ADMINISTRATION

Curricula leading to the degree of Master of Arts in Health Care Administra tion are available with concentrations in Hospital Administration, Administra tion of Long-term Care Facilities, Health Information Systems, and Comprehen sive Health Planning.

HOSPITAL ADMINISTRATION

The concentration in Hospital Administration is described on page 150, and leads to the degree of Master of Arts in Health Care Administration, Master of Business Administration, or Master of Public Administration.

ADMINISTRATION OF LONG-TERM CARE FACILITIES

The concentration in Administration of Long-term Care Facilities is described

on page 151, and leads to the degree of Master of Arts in Health Care Administration, Master of Business Administration, or Master of Public Administration.

HEALTH INFORMATION SYSTEMS

The concentration in Health Information Systems is described on page 151, and leads to the degree of Master of Arts in Health Care Administration, Master of Business Administration, or Master of Public Administration.

COMPREHENSIVE HEALTH PLANNING

The concentration in Comprehensive Health Planning leads to the degree of Master of Arts in Health Care Administration. This program is designed to prepare students to plan for and coordinate all aspects of private and public health care systems in accordance with sound management principles. It is an interdisciplinary program which includes course offerings in the areas of environmental health, medical care organization, mental health administration, sociology, and urban and regional planning.

The first phase of the program consists of the required courses in health care administration, plus required courses in comprehensive health planning. The second phase consists of supervised field experience. A written major report is required as part of phase two.

Post-Master's Graduate Certificate in Health Care Administration

STUDENTS WITH APPROVED MASTER'S DEGREES from accredited institutions may take a special Post-Master's program leading to a Post-Master's Graduate Certificate in Health Care Administration. Each program will be planned to meet the professional needs of the individual student, whether he wishes to undertake a new field of study or to amplify his knowledge of work done at the Master's level.

This program permits study in depth of such areas as health care administration consulting; comprehensive health planning; government health care administration at federal, state, and county levels; long-term care administration, including mental hospitals, nursing homes, and facilities for the aged; and health care administration research.

Prerequisite: a Master's degree from an accredited college or university and an academic average which indicates the ability to undertake advanced study. The applicant is also judged on his experience, character, and personality. Applicants lacking formal study in health care administration are required to take qualifying courses.

REQUIREMENTS FOR THE CERTIFICATE

Most students with adequate preparation in the health care field should be able to complete the requirements by taking a program of study with a mini-

mum of 30 semester hours of course work. Those lacking such specialized st will need more. At the discretion of the student's advisory committee a m mum of 6 semester hours may be transferred from another accredited insti tion if the work was taken for credit toward a graduate degree.

PROGRAM OF STUDIES

HCA 270 *Research in Health Care Administration* is required of all candida for the Certificate. The remaining courses consist of a program of study wor out in consultation with a faculty adviser and planned with consideration of t student's experience and educational background and his specific professio objectives.

Doctoral Study

WORK FOR THE DEGREES of Doctor of Business Administration and Doctor Public Administration is supervised by the Committee on Doctoral Studies.

ADMISSION

Completed application forms must be sent to the Office of the Admissions Of cer, School of Government and Business Administration, George Washin ton University, Washington, D.C. 20006. The applicant should ask three ind viduals, who are acquainted with his ability to do high-level academic work, write directly to the Chairman of the Committee on Doctoral Studies. The letters of reference should be on special forms which will be provided by t Committee Chairman. Applicants for the degree of Doctor of Business Admi istration must file results of the Admission Test for Graduate Study in Busine with the Office of the Admissions Officer before final approval of their app cations can be given. Applicants for the degree of Doctor of Public Admini tration must submit results of either the Admission Test for Graduate Study Business *or* the Graduate Record Examination to the Office of the Admissio Officer. These tests must have been taken within the past five years. Arrang ments to take these tests must be made with the Educational Testing Service, Nassau Street, Princeton, N.J. 08540; or 1947 Center Street, Berkeley, Cal 94704.

An applicant must have a degree of Master of Business Administration Master of Public Administration, as appropriate; or a Master of Arts degree an approved field; or the equivalent, together with acceptable personal qualiti and a capacity for creative scholarship. Each applicant must demonstrate h competence by qualifying examinations.

PLAN OF STUDY

The fields of (1) Administrative Theory and Practice and (2) Managerial Economics are required for the Doctor of Business Administration degree; the fields of (1) Administrative Theory and Practice and (2) American Politics Process and Public Administration are required for the Doctor of Public Ad

ministration degree. The Chairman of the Committee on Doctoral Studies, in consultation with the applicant, will designate two elective fields of study and will appoint an adviser to guide the student in his work in each of the fields undertaken. Elective fields may be chosen from such areas as Accounting, Administration in Metropolitan Areas, Behavioral Science in Organizations, Comparative and Developmental Administration, Finance and Investments, Government-Business Relations, Health Care Administration, Information Technology, International Business Administration, Managerial Economics, Marketing, Operations Research, Personnel Management, Production and Procurement, Public Financial Management and Budgeting, Public Personnel Management, Research and Development—Policy and Management, Transportation and Traffic, and Urban and Regional Planning. Most students will complete, prior to the General Examination, a minimum of 30 semester hours in graduate courses and such additional course work as may be prescribed by the adviser; but, the exact content of each program is determined in light of the student's background and competence after consultation with the appropriate faculty member in each of the fields undertaken.

Full-time students are normally expected to register for 9 to 12 semester hours each semester. All work for the Doctor's degree must be completed in five years unless an extension of time is granted by the Committee on Doctoral Studies prior to the expiration of the time limit. All course work must be taken on campus unless otherwise approved in advance by the Dean.

When the applicant has completed all course work and has satisfied his adviser and the Committee of his readiness to take the General Examination in the fields of study previously designated, the examination will be scheduled during the following February or October.

Upon successful completion of the General Examination and approval of the subject of the doctoral dissertation, the student may be admitted to candidacy by the Committee on Doctoral Studies. The candidate's research and the preparation of his dissertation are supervised by a Research Adviser designated by the Committee.

After admission to candidacy, the student must register for 24 hours of *Dissertation Research* (399). Full-time students must register for 9 to 12 hours a semester for 2 semesters, and for sufficient hours in the third semester to complete the 24-hour requirement. Part-time students must register for 6 semester hours a semester for 4 semesters. If the dissertation has not been completed during the time the student has registered for the required 24 hours, he must register for 3 semester hours of *Dissertation Research* (399) each succeeding semester until the satisfactory completion of the dissertation and the final oral examination.

THE DISSERTATION

A dissertation is required as evidence of ability to perform scholarly research and to interpret and present its results.

No later than the date specified in the calendar the candidate must submit to the Dean three complete copies of the dissertation and an original copy of an abstract of his dissertation for inclusion in the Announcement of the Final Examination and for reproduction by University Microfilms, Inc.

Printed copies of detailed regulations regarding the form and reproduction of the dissertation, preparation of the abstract, and services offered by University

Microfilms, Inc., are available in the Office of the Committee on Do
Studies. The successful candidate for the doctorate is required, before rec
his degree, to pay a fee to cover the expense of printing the abstract
dissertation, and for the basic service rendered by University Microfilms,
(see page 29).

THE FINAL EXAMINATION

The Final Examination of the candidate consists of his oral defense of the
sertation and is given by a committee appointed by the Committee on Doct
Studies. Upon successful completion of this oral examination the candidate
be approved for the degree of Doctor of Business Administration or Doctor
Public Administration by the Committee on Doctoral Studies.

RESIDENCE

The Committee on Doctoral Studies expects all students to remain registe
until *all* degree requirements are satisfied, although there is no formal regu
tion concerning the minimum amount of time of study either in preparation f
the General Examination or as a doctoral candidate engaged in research. Th
student who undertakes either part of the doctoral program on a full or limit
schedule must maintain "continuous registration" under the School of Gover
ment and Business Administration even when he is granted a leave of absen
for study or residence elsewhere. By failing to register for one semester
more, the student breaks his registration and must apply for readmission to th
School under whatever new conditions and regulations are set up by the Com
mittee or the member of the Faculty who directs his research. The student wh
has completed his tuition requirements, but whose graduation is deferred fo
any reason, must maintain continuous registration by paying the continuou
registration fee for the semester immediately preceding the graduation at whic
he expects to receive his degree.

Special Programs

GOVERNMENT MANAGEMENT INTERN SCHOLARSHIP PROGRAM

THE GOVERNMENT MANAGEMENT INTERN SCHOLARSHIP PROGRAM offers annually
fifty scholarships to assist federal agencies in training carefully selected young
men and women for administrative leadership in government career service.
Each scholarship provides a tuition-free course of 3 semester hours a semester.
and interns who maintain satisfactory standing in both their academic program
and their government training program may qualify for extension of the schol-
arship for one additional semester.

NAVY GRADUATE FINANCIAL MANAGEMENT PROGRAM

The Navy Graduate Financial Management Program, sponsored by the Naval
Postgraduate School, provides 45 semester hours of work in financial manage-
ment and related fields for a selected group of Naval and Marine officers. The

Master of Business Administration degree is awarded upon successful completion of this full-year program.

CONTINUING EDUCATION IN HEALTH CARE ADMINISTRATION

A nondegree program is conducted in the various areas of health care administration both on campus and off campus whenever a sufficiently large class is organized. Institutes, workshops, and lecture series are conducted under the auspices of program faculty and selected leaders from local, state, and regional areas on topics of current interest to the requesting organization. There is no specific prerequisite. Fees are to be announced.

THE INTERNATIONAL INSTITUTE FOR HEALTH CARE ADMINISTRATION

In recognition of special educational needs of students from other countries, The International Institute for Health Care Administration offers programs of instruction designed to meet these needs at either the degree or certificate level.

It is also equipped to enter into arrangements with principals of hospital systems in world-wide areas to assist in the preparation of teaching programs or the actual instruction of administrative personnel either abroad or at the University.

THE MANAGEMENT RESEARCH GROUP

The Management Research Group seeks to serve government, industry, and commerce by contributing to the development and understanding of basic theory in the field of management. The Group also provides assistance in translating theory into practice.

Relationships and techniques important to modern information flow and managerial decision-making are stressed. The research conducted extends to system design, analysis of system performance, and the evaluation of practice in relation to managerial criteria.

CERTIFICATION OF PUBLIC PURCHASING AGENTS

The School of Government and Business Administration participates in the National Institute of Governmental Purchasing professional certification program. Courses and examinations leading to qualification as "Certified Public Purchasing Officer" (CPPO) are provided. Inquiries may be directed to the School or to the National Institute of Governmental Purchasing, 1001 Connecticut Avenue, N.W., Washington, D.C. 20036.

OFF-CAMPUS DEGREE PROGRAMS

The School of Government and Business Administration has academic jurisdiction over off-campus programs leading to the following degrees: Bachelor of Science in Administration with concentrations in accounting and business administration and the Master of Science in Administration.

These degree programs are administered by the College of General Studies. For details concerning the off-campus programs see the *College of General Studies* Catalogue.

SCHOOL OF PUBLIC AND INTERNATIONA AFFAIRS

Dean B.M. Sapin

FACULTY*

Professors Joseph Aschheim, A.E. Burns, R.H. Davison, C.E. Galbreath, Ma
Gordon, Andrew Gyorgy, H.C. Hinton, W.C. Hopkins, Ching-Yao Ho
J.W. Kendrick, H.L. LeBlanc, R.K. Lewis, F.H. Michael, J.N. Mosél, B
jamin Nimer, Vladimir Petrov, J.W. Robb, H.M. Sachar, B.M. Sapin, R
Sharkey, Chung-wen Shih, Gaston Sigur, Henry Solomon, George Stambu
C.T. Stewart, Jr., R.B. Thompson, Helen Yakobson
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Young Kim, C.A. Linden, J.M. Logsdon, J.K. McDonald, J.A. Morgan, J
C.A. Moser, Peter Poole, Bernard Reich, Richard Thornton, S.J. Wayn
R.Y.C. Yin
Adjunct Associate Professors Donald Robinson, R.A. Young
Assistant Professors Thomas Brewer, S.W. Burks, R.E. Darcy, J.E. Fredlan
S.A. Grant, P.F. Klarén, D.L. Lee, H.R. Nau, P.L. Sargent *(Visiting)*, J.
Starrels, K.L. Storrs, G.C.Y. Wang, A.M. Yezer
Instructors R.L. Cole, Dana Fischer, Rachel Keith

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ton, W.R. Johnson, J.M. Logsdon, Vladimir Petrov, George Stambuk, Richa
Thornton

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R.M. Dunn, Jr., H.C. Hinton, H.L. LeBlanc, Benjamin Nimer, R.B. Thompso

COMMITTEE ON ADMISSION AND ADVANCED STANDING

F.H. Michael (*Chairman*), C.F. Elliott, Andrew Gyorgy, W.R. Johnson, J.A
Morgan, Jr.

* The President of the University, the Vice President for Academic Affairs, the Registrar of the University, the Director of Admissions of the University, and the University Librarian are ex officio members of the Faculty of the School of Public and International Affairs.
† The Dean of the School is an ex officio member of all committees.

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COMMITTEE ON RUSSIAN STUDIES

C.A. Moser (*Chairman*), C.F. Elliott, John Hardt, Vladimir Petrov, R.B. Thompson, Helen Yakobson

COMMITTEE ON SCIENCE, TECHNOLOGY, AND PUBLIC POLICY STUDIES

C.E. Galbreath, Andrew Gyorgy, J.M. Logsdon, J.K. McDonald, Benjamin Nimer

INTRODUCTION

With the establishment, in 1898, of the School of Comparative Jurisprudence and Diplomacy, the study of Government was first organized as a separate entity in the University. In 1928, this School was reorganized and broadened as the School of Government. During the next two decades, programs in business administration and public administration were added, and the emphasis gradually shifted from undergraduate to graduate study. The name was changed in 1960 to the School of Government, Business, and International Affairs to reflect more accurately the offerings of the School. A division of the School was effected in 1966, and two schools were established—the School of Government and Business Administration, a primarily professionally-oriented school, and the School of Public and International Affairs, a primarily policy-oriented school.

Programs of the School of Public and International Affairs are interdisciplinary, and emphasize governmental policy, both domestic and foreign.

Students in the freshman and sophomore years are registered in Columbian College of Arts and Sciences, the liberal arts college of the University, and are assigned special advisers from the School of Public and International Affairs to assist them in planning their programs.

ACADEMIC PROGRAMS

Programs available within the School of Public and International Affairs are undergraduate fields in Chinese Language and Literature, Chinese Studies, and Urban Affairs; undergraduate and graduate fields in International Affairs and Public Affairs; and graduate fields in Latin American Studies, Russian Studies, and Science, Technology, and Public Policy. Special programs in Soviet, Far Eastern, and East European studies are offered by the School's Institute for Sino-Soviet Studies.

OBJECTIVES

Four undergraduate programs of study—Chinese Studies, International Affairs, Public Affairs, and Urban Affairs—are aimed at preparing the student to understand major contemporary issues in international affairs or in domestic public

affairs. The programs are designed not to produce narrow professional
cialists, but to foster a liberal education, interdisciplinary in nature and broa
than a concentration in one of the conventional disciplines. In each progr
there is double effort: to develop a background as broad and as deep as po
ble in order to assist in the understanding and analysis of modern proble
and to give instruction in some useful tools of analysis. The program in Chin
Language and Literature is closer to the traditional liberal arts pattern,
phasizing language and culture.

The graduate programs leading to the degree of Master of Arts are m
concentrated. The student is expected to develop a greater competence in
area or a discipline, building on his undergraduate program in preparation
professional employment in government, in international organizations, in bu
ness, or in private agencies concerned with public or international affairs.

REGULATIONS

Regulations concerning ADMISSION, REGISTRATION, FEES AND FINANCES
stated on pages 21-33; other University regulations, on pages 43-51.

ATTENDANCE

A student may not attend classes until registration is completed and fees
are paid.

The student is held responsible for all the work of the courses in which he
registered, and all absences must be excused by the instructor in charge befo
provision is made for him to make up the work missed.

A student suspended for any cause may not attend classes during the perio
of suspension.

WITHDRAWAL

Withdrawal after the end of the fifth week of classes (fall or spring semester
without academic penalty is permitted only in exceptional cases (see "Wit
drawal," pages 45-46).

The Degree of Bachelor of Arts

THE SCHOOL OFFERS PROGRAMS leading to the degree of Bachelor of Arts in th
fields of Chinese Language and Literature, Chinese Studies, International Affairs
Public Affairs, and Urban Affairs.

ENTRANCE REQUIREMENTS

The satisfactory completion of the *Chinese Language and Literature, Chines
Studies and International Affairs, Public Affairs,* or *Urban Affairs* curriculum
in Columbian College of Arts and Sciences (see pages 79-81), or the equiva
lent, is required.

GENERAL REQUIREMENTS FOR THE DEGREE

The following requirements apply to both the standard 120-semester-hour and the special 90-semester-hour programs. See pages 167-68 for additional requirements for the 90-semester-hour program.

ACADEMIC WORK LOAD

Normal academic work load for the full-time student is 15 semester hours. A student with a strong academic record may take up to 18 semester hours with the approval of the Dean.

SCHOLARSHIP

In order to graduate, a student must have the following: (1) 120 semester hours (or 90 semester hours if the student qualifies for the special 90-semester-hour program) of passing grades (courses in Physical Education, Health, and Recreation cannot be included in the required hours); and (2) grades of *A* or *B* in four 3-semester-hour courses in the major, to be taken in residence at George Washington University. The major includes the required second-group courses (101-200) and courses taken in the group options.

DEAN'S HONOR LIST

The name of every student who attains a 3.50 quality-point index* in his course work is placed on the Dean's Honor List for that semester. Appearance on the list will be limited to (1) full-time students registered for a minimum of 12 semester hours and (2) part-time students registered for a minimum of 12 semester hours over a period of two consecutive semesters, which may include summer term.

ACADEMIC STANDING

A student who is not suspended or on probation is considered to be in good standing.

The following rules governing probation and suspension are applicable as stated to students enrolled for a full-time program (12 semester hours or more) during the fall or spring semester or the two summer sessions. For students taking less than 12 semester hours in any one semester or both summer sessions, these rules are applied on the basis of 12 or more hours taken during two or more semesters or summer sessions.

PROBATION

A student who in one semester receives two grades of *F*† in courses carrying 9 or more semester hours of credit each, or the equivalent, is placed on probation. A student on probation who receives one grade of *F*† in such a course

*See page 45 for explanation of the quality-point index.

†In determining whether a student is placed on probation or suspension, two grades of *D* are equated with one grade of *F*. Thus, for example, a student who receives one grade of *F* and two grades of *D* is placed on probation, and a student who receives two grades of *F* and two grades of *D* is suspended.

will be continued on probation for a second semester. A student on probati taking 12 or more semester hours whose grades are all *C* or better is remov from probation.

SUSPENSION

A student who in one semester receives grades of *F** in three courses carryi 3 or more semester hours of credit each, or the equivalent, is suspended. student on probation who receives two or more grades of *F** in such courses suspended. A student who receives one or more grades of *F** in such course in a second semester on probation is suspended.

A student who is suspended for poor scholarship may apply for readmissio after the lapse of either the fall or spring semester. To be considered for read mission, he must pass prescribed tests and submit evidence to the Dean's Cou cil that during his absence from the University he has so conducted himself a to indicate that he will profit by readmission. A student readmitted after su pension is on probation. In no case will the probationary period after readmi sion exceed 24 hours of study. A student suspended twice for poor scholarshi will not be readmitted.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized With drawal) may be assigned are described on page 44.

Removing an Incomplete.—The grade of *I* must be removed no later than th last day of the examination period for the fall or spring semester immediatel following the semester or summer session in which the grade of *I* is assigned. An "Incomplete" that is not removed within this period is automatically changed to an *F*. In cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the Dean, or the appropriate committee, for additional time in which to complete the work of the course. Such petitions should be submitted within the same period. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere.

RESIDENCE

A minimum of 30 semester hours, including at least 12 hours in the major field, must be completed while registered in the School of Public and International Affairs. This requirement applies to students transferring within the University as well as to students transferring from other institutions. Unless special permission is granted by the Dean to pursue work elsewhere, the work of the senior or final year must be completed in the School of Public and International Affairs.

USE OF CORRECT ENGLISH

Any student whose written or spoken English in any course is unsatisfactory

* In determining whether a student is placed on probation or suspension, two grades of *D* are equated with one grade of *F*. Thus, for example, a student who receives one grade of *F* and two grades of *D* is placed on probation, and a student who receives two grades of *F* and two grades of *D* is suspended.

may be reported by the instructor to the Dean. The Dean may assign supplementary work, without academic credit, varying in amount with the needs of the student. If the work prescribed is equivalent to a course, the regular tuition fee is charged. The granting of a degree may be delayed for failure to make up any such deficiency in English to the satisfaction of the Dean.

STUDY ABROAD

Students wishing to study abroad must consult with their advisers and the Dean, because arrangements must be made on an individual basis. Students should receive the Dean's approval, in advance, for their plan of study abroad if they plan to have the credits earned abroad apply to the degree program they are registered for in this School. A catalogue or other description of the foreign institution or study program should be presented for consideration together with detailed descriptions of the courses to be taken. Students of international affairs are encouraged to travel and study abroad.

CREDIT/NO CREDIT OPTION

A student in the School of Public and International Affairs who has a cumulative quality-point index* of 2.50 or better may, with the approval of his adviser and the Dean, take one course each semester and receive a grade of *CR*, Credit, or *NC*, No Credit, which will be recorded on the student's transcript but will not be reflected in his cumulative grade average. A student must sign up for such an option at registration. Under no circumstances may a student change from credit/no credit status to graded status, or vice versa, after the end of registration. Courses in the student's major (except those in which the grade of *CR* or *NC* is normally assigned) may not be taken on a credit/no credit basis. A transfer student may not elect to take a course on a credit/no credit basis until the second semester of his enrollment in the University. Students in the School of Public and International Affairs may take no more than six courses in which the grade of *CR* or *NC* is assigned, including those taken as freshmen and sophomores in Columbian College and those in which the grade of *CR* or *NC* is normally given.

CORRESPONDENCE AND HOME-STUDY COURSES

Credit for correspondence or home-study courses is not acceptable and cannot be applied toward a degree.

ADDITIONAL REQUIREMENTS FOR THE 90-SEMESTER-HOUR PROGRAM

Exceptional students may, when registered as freshmen or sophomores in Columbian College of Arts and Sciences, petition the Dean of the School of Public and International Affairs for admission to a special 90-semester-hour degree program in the School of Public and International Affairs, supplying supporting evidence in the form of achievement test scores, College-Level Examination Placement (CLEP) scores, and grades earned at George Washington University or any other institution. The Dean, in consultation with the Dean's

* See page 45 for explanation of the quality-point index.

Council, will determine eligibility for admission to the program, which wi effective upon the student's entering the School of Public and Internati Affairs at the beginning of the junior year.

In addition to the general requirements (see pages 165-67) and the curricu requirements (see pages 168-70), a student in the 90-semester-hour progr must fulfill the following requirements:

1. He must receive grades of *A* in 50 per cent of his total course work (in of the 90 semester hours), and also in 50 per cent of the courses required his major.

2. He must take at least 60 semester hours in courses beyond the first-gr level (numbered above 100).

3. The 90 semester hours of credit must be earned in actual course work, credit through Advanced Placement, special examinations, etc., may not counted in the 90 semester hours required for graduation.

Students who qualify for admission to the 90-semester-hour program are couraged to begin taking second-group courses (numbered 101-200) as soon they are qualified to do so, and should seek to obtain a waiver of course p requisites in those disciplines in which they have a strong background.

CURRICULUM REQUIREMENTS

To be recommended by the Faculty for graduation, candidates are required complete, in addition to the appropriate freshman and sophomore work (s pages 79-81), a minimum of 60 semester hours during the junior and seni years, as set forth in one of the following curricula.

EARNING CREDIT OR WAIVING REQUIREMENTS BY EXAMINATION

For information on earning credit or waiving curriculum requirements, s Columbian College of Arts and Sciences, page 74.

MAJOR FIELDS OF STUDY

Requirements for the five major fields of study leading to the degree of Bach lor of Arts are listed below. Students should consult the appropriate depart ment in the "Courses of Instruction" section of this catalogue for complete course descriptions.

CHINESE LANGUAGE AND LITERATURE

Prerequisite.—A minimum of 60 semester hours in Columbian College (see page 79–80), or the equivalent from another accredited institution.

Requirements for the Major.—Asia 11–12, 103, 105, 165, 167, and 36 semester hours of second-group Chinese literature courses. The student is required to pass a major examination at the end of the senior year. The coordinated field of knowledge upon which the student will be examined includes an active command of modern Chinese language and a general knowledge of Chinese literature and culture. A proseminar (199–200) assists the student in preparation for the major examination.

Students in the Chinese Language and Literature program may avail themselves of a junior year abroad, as in the Chinese Studies program (see page 169).

CHINESE STUDIES

The major in Chinese Studies is designed to introduce the student to a non-Western culture and to provide an understanding of the history, politics, and economy of modern China. The major is interdepartmental and is recommended for students who wish a comprehensive study of one of the world's major civilizations and for those who contemplate graduate study in Chinese or Far Eastern Affairs.

Prerequisite.—The Chinese Studies curriculum, page 80, including Asia 5–6.

Requirements for the Major.—(1) Asia 11, and 165 or 167; (2) Econ 169; (3) 3 semester hours selected from Geog 125, 126, 127, 132, 145, 146, or 161; (4) 6 hours selected from Hist 138, 187, 188, 195, 196 (either Hist 187 or 196, but not both, may be selected); (5) 3 hours selected from P Sc 101, 193, 194; (6) 24 semester hours of related course work in Economics, History, or Political Science, to be selected with the approval of the adviser, of which 6 hours must be a research and writing seminar.

INTERNATIONAL AFFAIRS

The major in International Affairs enables the student to specialize in international political relations, international economics, international communications, or regional studies.

Prerequisite.—The International Affairs curriculum, page 80.

Requirements for the Major.—(1) Econ 181–82; (2) 6 semester hours of a third year of foreign language (may be a literature course taught in the language); (3) 3 semester hours selected from Geog 125, 126, 127, 132, 145, 146, or 161; (4) Hist 150 or 157, and 182; (5) P Sc 171, and 181 or 182; (6) 15 semester hours from one of the Group Options listed below:

Group I. International Politics—courses concerned with theory and practice in international affairs, forces shaping the world scene, and American foreign policy, selected from Geog 125, 126, 127, 146 (if not elected to satisfy the Geography and Regional Science requirement); Hist 138, 139–40, 149, 183, 184; P Sc 107, 111, 112, 117–18, 160, 167, 172, 189 (P Sc 181 or 182 may be elected if not taken to satisfy the major requirement).

Group II. International Economics—courses concerned with the world economy and American policy and practice in international trade and finance, selected from B Ad 176, 178; Econ 101, 102, 104, 121, 122, 134, 147; Geog 125, 126, 127, 132, 134; Stat 111, 112, 122.

Group III. International Communications—courses concerned with the study of international information programs, public opinion, psychological warfare, cultural relations, and public relations, selected from Anth 150, 153, 157, 161, 162; Geog 125; Jour 145, 146; P Sc 146, 167; Psyc 115, 151, 156; Soc 144.

Group IV. Regional Study—a concentration in one of the following areas: (1) Africa—courses selected from Anth 178, 179, P Sc 189, 190, 192; (2) Europe—courses selected from Econ 147, Hist 131–32, 141–42, 147, 149, 151–52, 158, 162, P Sc 111, 112, 117–18; (3) Far East—courses selected from Anth 173, 174, 175, Asia 165, 167, Econ 169, Hist 138, 187, 188, 195–96, P Sc 101, 193, 194; (4) Latin America—courses selected from Anth 170, 172, 185, Econ 185–86, Geog 161, Hist 162, 163–64, 165, 166, P Sc 177, 178, interdisciplinary seminar 287 offered by six departments participating in the Latin American Studies program; (5) Middle East—courses selected from Anth 177, Hist 149, 158, 193, 194, P Sc 191, 192, Rel 161; or (6)

Soviet Union and Eastern Europe—courses selected from Econ 133, 13
Hist 138, 143, 145, 146, 188, P Sc 112 or 115, 160, 163, Slav 161–62, 16
166, 193–94.

PUBLIC AFFAIRS

The major in Public Affairs deals with domestic government and policy.

Prerequisite.—The Public Affairs curriculum, pages 80–81.
Requirements for the Major.—(1) Econ 101, 161, 162; (2) Hist 175–76;
P Sc 121 or 122, 126 or 151, 145; (4) 12 semester hours from one of the G
Options listed below:

Group I. Economics—courses selected from Econ 102, 104, 121, 122, 123
136, 142, 165, 181–82.

Group II. Politics—courses selected from P Sc 103, 104, 108, 111, 119–20
125, 126 (if not taken as a major requirement), 146, 167, 199.

Group III. Urban Affairs—courses selected from B Ad 174; Econ 157;
Educ 123; Geog 141; P Sc 103, 104; Psyc 151; Soc 126.

URBAN AFFAIRS

The major in Urban Affairs introduces students to the problems and issues
urban America and develops some of the practical skills necessary for deali
with actual decision-making situations in urban-related occupations. Empha
is on urban public policy—the forces and processes that shape it and its ad
quacy in terms of current and anticipated needs.

The student may specialize either in the political and administrative aspects
the policy-making process, or in the analysis and evaluation of specific poli
areas. An adviser works closely with each student to develop a program suit
to his personal interests and objectives. In his senior year, the student serves
apprenticeship in an urban-related agency or research organization and also
tends a weekly seminar in which the work experience is related to a body
academic literature.

Prerequisite.—The Urban Affairs curriculum, page 81.
Requirements for the Major.—(1) Econ 157 and one additional 3-semester-ho
course in Economics, Geog 140, P Sc 104, 151, 183–84, 185–86, and one additio
3-semester-hour course in Political Science, and either Stat 104 and 105 or Stat 1
and 112; (2) 6 semester hours selected from Acct 115, P Sc 105, Stat 97, 114, 1
118, 123; (3) 9 semester hours selected from B Ad 174, Econ 136, 165, 243, P
246, 249, 250, Soc 147, U&RP 153, 201 (special arrangements necessary to ta
graduate courses in Public Administration or Urban and Regional Planning).

Because they participate in the senior apprenticeship and seminar, majors in Urb
Affairs may not elect courses in the Service-Learning Program.

The Degree of Master of Arts

THIS SCHOOL OFFERS PROGRAMS leading to the degree of Master of Arts in th
major fields of International Affairs; Latin American Studies; Public Affair
Russian Studies; and Science, Technology, and Public Policy.

ADMISSION REQUIREMENTS

Application forms are available from the Graduate Admissions Office, School of Public and International Affairs, George Washington University, Washington, D.C. 20006.

A Bachelor's degree from an accredited college or university, with a *B* average or better, or the equivalent, in the relevant undergraduate major, is required. If there is evidence of special promise, such as high GRE scores, an applicant whose academic record falls short of *B* will be given serious consideration. Scores on the Aptitude Test of the Graduate Record Examinations as well as letters of recommendation are required.

In International Affairs.—The applicant's undergraduate program should include background courses corresponding to the interdepartmental undergraduate major in International Affairs at this University (see pages 169-70), or some other relevant social science program. In the case of major deficiencies in the social sciences or international relations, additional course work may be specified beyond the minimum requirements for the Master's degree. The student's particular responsibilities will be indicated in his letter of admission to the program and in the course of subsequent consultation with an assigned faculty adviser.

In Latin American Studies.—The applicant's undergraduate program should include background courses corresponding to an undergraduate major in Latin American Studies at this University (see pages 331-32) or equivalent. Majors in other fields may be considered for admission provided their undergraduate course work includes Spanish or Portuguese and sufficient course work in three of the following six areas: Anthropology, Economics, Geography and Regional Science, Hispanic Literature, History, and Political Science.

In Public Affairs.—An undergraduate major in Public Affairs, Economics, History, or Political Science, depending upon the field of specialization in the Master's program, is required. Any course deficiency in the undergraduate Public Affairs curriculum, as stated on page 170, must be made up.

In Russian Studies.—An undergraduate major in a pertinent field is required. The undergraduate program should have included the following courses, or equivalent: Hist 145, 146; P Sc 112; Slav 1–2 and 3–4, or 5–6.

In Science, Technology, and Public Policy.—Undergraduate majors in a social, life, or physical science, or in engineering are eligible for admission, although those lacking adequate preparation in relevant social sciences may be required to take additional courses; such requirements will be indicated in the letter of admission to the program.

READMISSION

A graduate student who has not maintained continuous registration and has not registered for one or more semesters must file an application for readmission. Applications for readmission are reviewed by the Dean and the Committee on Admission.

GENERAL REQUIREMENTS

There are two options available in all fields leading to the Master of Arts gree except Russian Studies. One requires a minimum of 24 semester hour approved graduate course work plus the successful completion of a thesis; student must register for 6 semester hours of *Thesis Research* (299–300). second option requires a minimum of 36 semester hours of graduate co work and does not include a thesis. In the field of Russian Studies, only first of these two options, including the thesis, is permitted. The course w for both options is taken in preparation for the Master's Comprehensive Exa nation.

Master's degrees are awarded by vote of the Faculty after the student completed the required course work and an acceptable thesis (if one is electe has satisfied the foreign language or tool requirement, and has passed the M ter's Comprehensive Examination. An applicant whose background does include the necessary courses or equivalent work experience must take a p gram longer than the minimum hours required.

Under special circumstances second-group courses (numbered 101–200) m be counted toward the Master's degree when registration for graduate cre has been approved at the beginning of the course by the curriculum advis the instructor, and the Dean. The student who takes an undergraduate cour for graduate credit is expected, by arrangement with the instructor, to do wo at the graduate level in addition to the regular work of the course. Normal no more than 6 semester hours of second-group courses may be taken f graduate credit in the 30-semester-hour program, and no more than 9 semes hours may be taken for graduate credit in the 36-semester-hour program. N work counted toward a Bachelor's degree may also be counted toward Master's degree.

All work for a Master's degree must be completed in five years, unless extension of time is granted by the Dean.

No credit is granted for work done *in absentia* or without formal instructio except for the thesis, which may be completed *in absentia* with the permissio of the curriculum adviser and the Dean. No more than 6 semester hours graduate credit may be transferred from other accredited institutions or anoth division of the University, and these may be accepted only under limited cond tions of time, grades, and relevance to the student's program.

A student who expects to continue his studies for the degree of Doctor Philosophy in the field of International Relations after receiving the Master degree in the field of International Affairs is strongly advised to plan from th beginning so that work for the lower degree will fit into a subsequent doctora program in the Graduate School of Arts and Sciences (see pages 92-96, 99-101)

TOOL REQUIREMENTS

In most programs of study a candidate for the degree of Master of Arts mus show that he has a reading knowledge (certified by the appropriate languag department) of at least one modern foreign language, to be approved by th Dean. A Master's degree candidate whose native language is not English may not select his native language to meet the tool requirement; he may selec

English to fulfill this requirement with the approval of his adviser and the Dean. The examination is administered by the Department of English.

Candidates in the field of Public Affairs and in the field of Science, Technology, and Public Policy may substitute statistics for a foreign language. This requirement may be met by demonstration of proficiency at the level of Stat 105, 112, or 197.

Candidates in the field of International Affairs may petition the Dean to substitute statistics for a foreign language. The primary basis for approving such petitions will be the relevance of the statistical skills to the student's thesis research.

The language or tool examination should normally be taken before the student has completed the first 15 hours of his work. No student may take the examination more than three times.

Courses taken to fulfill the tool requirement are not counted in the semester-hour requirement for a Master's degree.

MASTER'S COMPREHENSIVE EXAMINATION

In addition to any course examinations, the candidate must pass a written Master's Comprehensive Examination. Examinations are scheduled twice a year (usually in November and April), and should be taken during the last semester of course registration or shortly after the completion of the prescribed course work. If there is a lapse of time between completion of course work and the examination, the student must maintain "continuous registration" during this period. The candidate must consult with his adviser, well in advance, as to the date of his examination and the definition of the subject-matter fields which this examination is to cover. An oral examination on his thesis or major report may also be required.

SCHOLARSHIP

Grades for graduate work are *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal; and *CR*, Credit.

An average of *B* or better is required for the Master's degree. The grade of *C* is not considered as failing but must be counter-balanced by a grade of *A* in a graduate course of equal status.

A Master's candidate who receives a grade of *F* is required to present cause for consideration by the Dean's Council as to why he should be allowed to continue his studies.

Whenever a grade has not been assigned, the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) will be recorded. The symbol *I* indicates that a satisfactory explanation has been given to the instructor for the student's failure to complete the required work of the course. An "Incomplete" cannot be made up after the lapse of one calendar year except by written permission of the Dean's Council. An "Incomplete" which is not removed within one calendar year remains as a grade of *I* on the student's record. An "Incomplete" cannot be removed by reregistering for the course.

THE THESIS

The thesis subject should be selected as early as possible so as to permit effective integration with the course work.

The subject must be approved by the student's adviser and the member the Faculty under whom the thesis is to be written. The thesis in its final fo must have the approval of the thesis director *and one other reader,* and t copies must be presented to the Dean by the student no later than the d announced in the Calendar. Printed copies of detailed regulations regarding form and reproduction of the thesis are available in the Office of the Dean.

Payment of tuition for the thesis entitles the candidate, during the period registration, to the advice and direction of the thesis director and the oth reader. In case a thesis is unfinished, an additional calendar year may granted without further tuition payment. The student must, however, maint continuous registration (see page 47) during this period. If the preparati of the thesis extends beyond the additional calendar year, *the student m register for the entire 6 hours of thesis again* and pay tuition as for a repeat course.

FIELDS OF STUDY

Specific requirements for each of the five fields of study leading to the degr of Master of Arts are listed below. For prerequisites, see "Admission Requir ments," page 171.

INTERNATIONAL AFFAIRS

The program leading to the degree of Master of Arts in the field of Internation Affairs provides the student with a wide choice of fields within three broad area of study: general, supplemental or special, and regional. Graduate courses i Anthropology, Business Administration, Economics, Geography and Region Science, History, Political Science, Psychology, and Sociology relate to thes fields, which are listed below:

General Fields of Study.—International Politics, Comparative Governme and Politics, Modern Political Theory (including Socialist and Communi Theory), and International Economics.

Supplementary or Special Fields.—International Law; International Organi zation and Administration; International Economic Development; Internationa Communications; International and Comparative Aspects of Communism; U.S. Diplomatic History; U.S. Foreign Policy; and Science, Technology, and Public Policy.

Regional Fields.—Modern history, or government and politics, or economi history and problems of one of the following: Western Europe, Eastern Europe the Soviet Union, Latin America, the Middle East, Africa, South and Southeas Asia, and China.

Each degree candidate must select at least one "general" field. His field should also represent at least two disciplines. Candidates will be examined o their selected fields of study in the Master's Comprehensive Examination (se page 173).

Candidates who elect to write a thesis must choose *three* of the listed field and take, in addition to the thesis, a minimum of 24 semester hours of graduate course work in at least two departments, not exceeding 15 semester hours in either.

Candidates electing a program without a thesis must choose *four* fields and may take no more than 21 of their required 36 semester hours in one depart

ment. They must also include in their program at least two research seminars (6 semester hours) requiring the preparation of substantial research papers.

Courses should be chosen, in consultation with the adviser, with a view to their relevance to the selected fields. It should be understood, however, that course work constitutes only partial preparation for the Master's Comprehensive Examination. Each student is also expected to pursue a program of additional reading in each of his selected fields, in accordance with the advice of the faculty member responsible for instruction in that field.

LATIN AMERICAN STUDIES

The program leading to the degree of Master of Arts in the field of Latin American Studies is designed to provide the student with an appropriate area background in three or four of the following fields: Anthropology, Economics, Geography and Regional Science, Hispanic Literatures, History, and Political Science.

All degree candidates must complete 12 semester hours of graduate work, including the interdisciplinary seminar (287), in a major field selected from those listed above, and 6 semester hours in each of two minor fields selected from those listed above. If a student elects not to write a thesis, he must take 6 semester hours in a third minor field selected from those listed above, and an additional 6 semester hours in any of his fields, major or minor. The Tool Requirement (see pages 172-73) must be satisfied by demonstration of proficiency in Spanish or Portuguese, or in English if the student's native language is Spanish or Portuguese. The Master's Comprehensive Examination (see page 173) will cover all the student's selected fields.

PUBLIC AFFAIRS

The program leading to the degree of Master of Arts in the field of Public Affairs allows the student to specialize in either domestic economics or domestic politics. The student may select his courses in consultation with an adviser to emphasize either political science, economics, or American history, provided (1) he elects no more than 15 hours of courses in one department under the 24-hour plus a thesis program, or (2) he elects no more than 21 hours in one department under the 36-hour program without a thesis. Course work may include Economics (public finance, national income, economic development, regional and urban economics, monetary theory, labor economics, welfare economics); History (U.S. social history, political history, economic history, recent history); Political Science (political parties, public opinion and political socialization, constitutional law, the American presidency, legislative process, state and local government, comparative political analysis).

RUSSIAN STUDIES

The program leading to the degree of Master of Arts in the field of Russian Studies requires the following courses: Econ 133; Hist 237, 245; P Sc 224, 229, 269; Slav 161-62 or 165 and 166; and *Thesis Research* (299-300). The thesis, which is required of all students in this field, should be interdisciplinary in approach. With the exception of the thesis, students may, with the approval of the adviser, substitute alternate courses for those in the required program.

SCIENCE, TECHNOLOGY, AND PUBLIC POLICY

The program leading to the degree of Master of Arts in the field of Scien Technology, and Public Policy is flexible and is carefully planned and co ducted in consultation with an adviser. All degree candidates are required take 9 semester hours in the core field of science, technology, and public poli consisting of P Sc 205, P Sc 206 or 208, and a course in methods for the ana sis of public policy. A second field must be chosen from one currently offer in the international affairs or public affairs programs of the School. Studen who elect to write a thesis must select one additional field, and those who el not to write a thesis must select two additional fields. The third (and fourt fields may also be chosen from those currently offered in international affairs public affairs, or may be interdisciplinary, developed in consultation with t adviser and drawing upon the total resources of the University in order to fo on a particular policy issue or area. Such a special field must be approved the student's adviser and the Dean.

Institute for Sino-Soviet Studies

THE INSTITUTE FOR SINO-SOVIET STUDIES provides a program of specializ graduate study and research within the School of Public and Internationa Affairs. Courses of the Institute are drawn from a variety of academic are and thus provide an interdisciplinary approach to the study of Russia and th Soviet Union, Eastern Europe, and East Asia, and of the Communist mov ment within and among the countries of these areas. Faculty members conduc seminars and reading courses in the disciplines of economics, geography, histor language and literature, law, political science, and psychology.

The Institute provides Master's and Doctoral candidates with the opportuni to combine a course program of Sino-Soviet Studies with the work in their ow disciplines.

Students who are preparing for the degree of Master of Arts in the field International Affairs in the School of Public and International Affairs, or fo the degree of Master of Arts in the field of Economics, History, or Politic Science in the Graduate School of Arts and Sciences, with specialization Sino-Soviet Studies, may take one-half of their course work from the Institute program.

Students working toward the degree of Doctor of Philosophy in Internationa Relations with special emphasis on the Sino-Soviet area are expected to com bine work in the Institute with work in the fields of economics, history, an political science. Doctoral candidates in the field of Political Science will tak their Sino-Soviet work in the form of appropriate sub-fields of the major an minor fields. Doctoral candidates in the field of History are expected to take least two of the four fields of the degree in the history of the countries of thei specialization. All work leading to the degree of Doctor of Philosophy is under the general supervision of the Graduate School of Arts and Sciences and Con sultative Committees designated by that School which direct the work of each graduate student upon admission to degree candidacy. A faculty member of the Institute will serve as adviser to the candidate. The candidate's committee will be formed from members of his disciplinary department. A candidate for such

degree should assume that his committee will require the substitution of a reading examination in Chinese or Russian for one of the two Western languages normally required for the degree.

RESEARCH

Research work is integrated with the teaching program. Members of the research program belong to different disciplines and include not only faculty but also selected graduate students. Research monographs are being published by the Institute.

A special brochure describing in more detail the work of the Institute is available upon request.

INTERUNIVERSITY RESEARCH COLLOQUIA

Scholars from George Washington University, American University, Georgetown University, Howard University, the School of Advanced International Studies of Johns Hopkins University, and the University of Maryland conduct two interuniversity research colloquia. The Colloquium on East Asia is under the chairmanship of Professor Franz Michael; the Colloquium on Russia and Eastern Europe is under the chairmanship of Professor Andrew Gyorgy. Research in progress by members of the colloquia and plans for future research are discussed at weekly meetings. Advanced graduate students can be admitted on approval of the chairman concerned. They receive 3 semester hours of academic credit for each semester of participation, which includes preparation of written work of their own.

War College Program

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS offers an off-campus program at the National War College leading to the degree of Master of Science in International Affairs. Admission is limited to selected members of the faculty and student bodies of the War College.

The program of study is complementary to that portion of the War College's curriculum pertaining especially to international relations and foreign policy.

DIVISION OF UNIVERSITY STUDENTS

Dean J.G. Allee, Jr.
Assistant Dean B.K. Netland

DEAN'S COUNCIL*

J.G. Boswell, A.H. Desmond, Hewitt Kenyon, R.B. Thompson

INTRODUCTION

THE DIVISION OF UNIVERSITY STUDENTS was established in 1930 to make the regular course offerings of the University more generally available to members of this metropolitan community and to others who are not at the time candidates for degrees in this University. In this Division are registered students who wish to undertake university courses for credit or as auditors. University Students, often employed in government or industry, may be taking courses to increase their vocational fitness or to inform themselves on new developments in the arts and sciences. They may be taking courses as a matter of personal interest for cultural enrichment. Such students may be candidates for higher degrees in other institutions, sent here for special work as part of a graduate program. They may be undergraduates, matriculated in other colleges, taking summer sessions courses only or courses for transfer during the regular academic year with the approval of their own institution. They may be students from institutions outside the Washington metropolitan area enrolling in an appropriate "Washington Semester" program. To serve members of such groups and others not enrolled in degree-granting branches of the University is the function of the Division of University Students.

The privilege of attending George Washington University as a nondegree student is granted on the basis of maturity and proper preparation. Because no degree at George Washington University is involved, there can be no meaningful advisory system in the Division. However, students are invited to seek advice from academic departments. University students are urged to apply to the Office of Admissions for transfer to degree-granting branches whenever such action is appropriate.

All courses except those restricted to medical and law students and those limited to specific degree candidates are open to students in the Division of University Students. Students wishing to take Engineering and Applied Science courses should consult the *School of Engineering and Applied Science* Catalogue.

Registration in a given course may be denied students in this Division when space is needed for degree candidates.

* The Vice President for Academic Affairs, the Dean and the Assistant Dean of the Division are ex officio members of the Council.

An applicant who has been denied admission to any degree-granting branch of the University will not be considered for admission to the Division of University Students for the semester for which the applicant was denied, except upon written recommendation of the dean of the college or school that denied the applicant. However, an applicant who has been denied may be considered in subsequent semesters.

Nondegree students who have not completed a Bachelor's degree may not enroll in graduate courses offered by the School of Government and Business Administration.

ENTRANCE REQUIREMENTS*

Good character and an academic background appropriate for the program of studies contemplated are required.

A person not working for a degree at this University will be considered for admission to the Division of University Students to take courses for which he has adequate preparation, as determined by the departments concerned.

Although the deadline for applications for admission to the Division of University Students is the Friday before the first day of registration (see pages 5, 6), applicants are urged to apply earlier because no special exceptions can be made to permit registration for credit after the last day for adding classes (see page 180) even though the requiring of credentials, records, and test scores may delay the action on an application for admission. Subject to the permission of the department concerned, the deadlines for late registration, adding, dropping, and withdrawal do not apply to auditors.

Scholastic records are required of

1. An applicant who has graduated from high school within the previous two calendar years. Such an applicant must pass designated aptitude tests or meet the following requirements, which are the same as those for admission to Columbian College of Arts and Sciences and the School of Government and Business Administration.
   a) An acceptable certificate of graduation from an accredited secondary school, showing at least fifteen units† which must include four years of English; at least two years of one foreign language; two years of science, preferably with laboratory instruction; two years of social studies, one of which must be American history; and two years of college preparatory mathematics. It is to be noted that one unit of algebra, or the equivalent, is prerequisite to courses in chemistry and statistics, and that one unit in algebra and one unit in plane geometry, or the equivalent, are prerequisite to courses in mathematics and physics.
   b) The principal's statement that the applicant is prepared to undertake college work.
   c) College Entrance Examination Board scores on the Scholastic Aptitude Test and the English Composition Achievement Test.

* Foreign students, see page 26.
† A unit represents a year's study in a secondary school subject, including in the aggregate not less than 120 sixty-minute periods, or the equivalent, of prepared classroom work.

2. An applicant who has been subject to any form of academic or disc
nary action at any college or university within the previous calendar year.
3. High school students who are applying for the Secondary School Ho
Program (see page 182).
4. An applicant who has not completed high school or the equivalent. S
an applicant may be required to take assigned aptitude tests at the Univers
Counseling Center.

Scholastic records may be required of

1. An applicant who has attended any college or university during the p
vious calendar year.
2. A former student of this University who was on probation or suspend
and, since then, has attended another college or university.
3. An applicant who has *ever* been subject to academic or disciplinary a
tion. When scholastic records are required, a student may be admitted for o
semester or summer term only, pending receipt of records and under provisio
stated by the Office of Admission.

REGULATIONS

Regulations concerning ADMISSION, REGISTRATION, FEES AND FINANCES *ar
stated on pages 21-33; other University regulations, on pages 43-51.*

Prospective and registered students are urged to acquaint themselves with th
regulations concerning "Attendance" (see pages 43-44) and "Withdrawal" (se
pages 45-46).

The following specifically applies to all students in the Division of Universit
Students:

Last day to add a class for credit—end of first week of classes.

Last day to drop a class for credit or withdraw from the University—end o
the ninth week of classes. (See Calendar for beginning date of classes, page
5, 6.)

Equivalent amounts of time apply to the summer sessions.

ACADEMIC WORK LOAD

The normal academic work load is not more than 10 hours for a student em
ployed more than 20 hours a week and not more than 17 hours for a full-time
student. (Hours for courses graded *I*, "Incomplete," will be included in subse
quent academic work load.) Exceptions to these limits must be approved by the
Dean.

SCHOLARSHIP

A student who fails to maintain the scholarship requirements of this Division
may be dismissed from the University.

Normally, any course may be repeated for credit. All grades received in the
Division of University Students remain on the record, and scholarship require
ments are based on the total record. A course taken for audit may not be re
peated for credit (see page 46).

GRADES

Undergraduate.—*A*, Excellent; *B*, Good; *C*, Average; *D*, Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal.

Graduate.—For graduate work, grades are indicated as *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal.

The "credit/no credit" option, which permits students to take courses in which they receive the grade of either "Credit" or "No Credit," is not available to students registered in the Division of University Students.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) and *W* (Authorized Withdrawal) may be assigned are described on page 44.

Removing an Incomplete.—Although the grade of *I may* remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work (usually the final examination or a required paper) must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An "Incomplete" cannot be made up after the lapse of one calendar year except by written permission of the Dean's Council. An "Incomplete" which is not removed within one calendar year remains as a grade of *I* on the student's record.

PROBATION AND SUSPENSION

A student taking courses for undergraduate credit is subject to the same "Probation" and "Suspension" regulations as those of Columbian College of Arts and Sciences (page 71).

A student taking any courses for graduate credit must maintain a cumulative quality-point index in these courses of 3.00 or the equivalent. If in 12 hours or more of graduate credit the cumulative (graduate) index falls below 3.00, the student will be placed on probation. If in 12 hours or more of graduate credit, the cumulative (graduate) index falls to 2.25 or below, the student will be suspended.

A student taking (or having taken) some courses for undergraduate credit and taking (or having taken) some courses for graduate credit will be considered on probation if the standards stated above are not maintained in either undergraduate or graduate work. Similarly a student suspended from undergraduate or graduate work is suspended from all work in the Division.

A suspended student will not be permitted to audit a course in the Division during the period of suspension.

CHANGES IN PROGRAM OF STUDIES

Changes within the Division of University Students.—A student may not change or drop courses (see "Withdrawal," pages 45-46) or change his status to that of auditor except with the approval of the Dean.

Change from one section to another of the same course may be made with the approval of the Dean and the department concerned.

Transfer within the University.—Transfer to or from the Division of Uni
sity Students may be made only with the approval of the deans concerned.
Application for transfer to degree candidacy will be considered only af
the completion of at least one semester in the Division of University Stude
or upon request from the college or school to which the student is seeki
admission.

The student wishing to transfer to degree candidacy must meet the cond
tions of the college or school to which he is applying. It is the responsibili
of the student to consult the relevant degree-granting college or school co
cerning all conditions to be met and the amount of work transferrable.

SECONDARY SCHOOL HONORS PROGRAM

The outstanding secondary school student in the Washington metropolitan ar
who wishes to enrich his academic background and participate in stimulatin
college work is encouraged to seek admission to the George Washington Un
versity's Secondary School Honors Program. The Honors Student is enrolle
in regular college courses of his own choosing appropriate to his level of studi
his background, and his aptitude as determined through consultation with hi
high school counselors and advisers at the University.

Credit earned in the Program is applicable toward a degree at George Wash
ington University should the student later matriculate here. The transfer o
credit elsewhere depends upon the policies of the individual schools to which
the student might later apply.

Admission to the Honors Program is highly competitive. Normally, only 15
students a semester will be admitted to this Program, and each student will re
ceive a scholarship totaling 50 per cent of his tuition (excluding laboratory
and University Center fees). Admission is for one semester only, but students
doing well will be given preference for continuation and may be readmitted
for a second semester. Criteria for admission are based on a transcript of the
student's grades to date, available test scores, evidence of emotional and inte
lectual maturity, and the results of the interview with the Director.

Application forms and further information may be obtained from the Di
rector of the Secondary School Honors Program, Division of University Stu
dents, George Washington University, Washington, D.C. 20006. No applica
tions will be considered after the Friday before the final day of registration for
the semester concerned. For application for the summer session see the *Summe
Sessions Catalogue*.

DIVISION OF EXPERIMENTAL PROGRAMS

Director C.C. Mondale

THE UNIVERSITY is committed to the continuous development of new curricular options for its faculty and students. The Division of Experimental Programs (formerly the Office of Program Development) has as its function the support of such curricular experimentation and development. This University-wide curricular development program has three objectives: (1) a more direct relationship between campus and off-campus resources and interests; (2) cooperation among the academic divisions of the University in the development and sponsorship of new courses and programs; and (3) experimentation with new ways of teaching and learning.

Under the auspices of the Division of Experimental Programs, students, faculty, and administrators throughout the University are involved in the planning, teaching, and evaluating of experimental courses and programs. Many such curricular experiments are sponsored by other academic units of the University. There are presently two academic programs directly sponsored by the Division, the Program in Experimental Humanities and the Service-Learning Program.

The Program in Experimental Humanities offers courses which provide opportunities for students to combine sustained field-study with classroom work. These courses are taught by interdisciplinary and interdivisional faculty teams.

The Service-Learning Program integrates supervised work-study with classroom seminars. Students in the Program are assigned to community groups, research organizations, or governmental agencies. Assignments are arranged by means of a formal agreement among the student, the Program, and the off-campus agency.

The Division of Experimental Programs sponsors a special program in curricular development, the GW-Washington Project, which is charged with mobilizing academic resources throughout the University that can appropriately address needs in the Washington communities, particularly the communities of poverty. Among the activities of the Project is a technical assistance program in the Congress Heights-Anacostia area, co-sponsored by the United Planning Organization. The Project, in conjunction with the Spanish Education Development Center, places bilingual students in the Spanish-speaking inner city. A Community Leadership Development Program makes available short-term

tuition support for community leaders and offers stipends to selected stude for work in community agencies.

The Division of Experimental Programs is funded through grants from t Richard King Mellon Charitable Trusts and from the National Endowment f the Humanities, as well as from the general funds of the University.

ASSOCIATES

Roderick French, *Program Coordinator, Humanities Development Program*
Robert E. Cannady, Jr., *Director of Community Relations, GW-Washingto Project*

STEERING COMMITTEE

Harold F. Bright, *Provost and Vice President for Academic Affairs, Chairman*
Philip Birnbaum, *Associate Dean of the Medical Center, for Administrativ Affairs*
Marcella Brenner, *Professor of Education*
Jacqueline Goodnow, *Research Professor of Psychology*
Guenther Hintze, *Research Professor of Electrical Engineering*
William D. Johnson, *Director of Planning and Budgeting*
Henry Solomon, *Professor of Economics*

THE SUMMER SESSIONS

Dean C.W. Cole
Assistant Dean Lawrence Winkler

DURING THE SUMMER OF 1973, Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Government and Business Administration, the School of Public and International Affairs, the School of Engineering and Applied Science, and the Division of University Students offer courses in two 5-week sessions. The School of Engineering and Applied Science also offers courses in a 7-week period. The National Law Center offers courses in two 6-week sessions and one 13-week session; the School of Education offers courses in a 6-week session and three 3-week workshop sessions. In addition, a carefully planned group of special programs will be offered to serve a variety of student needs.

For a complete statement concerning summer-term work, see the *Summer Sessions Catalogue*.

OFFICE OF THE VICE PRESIDENT FOR POLICY STUDIES AND SPECIAL PROJECTS

Vice President L.H. Mayo

THE VICE PRESIDENT for Policy Studies and Special Projects is responsible t
the President of the University for developing a multidisciplinary Universi
capability for analyzing national policy issues, with involvement by the Co
sortium universities, foundations, federal agencies, industry, and other organ
zations having interaction with the governmental process.

Working closely with the Vice President for Academic Affairs, the Vi
President for Policy Studies and Special Projects assists in developing facul
research capability for policy studies, recommends the introduction of ne
curricula in the policy analysis area—in particular at the postgraduate an
advanced professional levels—and provides a continuing appraisal of the publ
advisement function of the University. The Office of the Vice President fo
Policy Studies and Special Projects serves the University as the locus for di
cussion and as an advisory resource on interdepartmental and interdisciplinar
research related to the analysis of public policies and on curricula pertainin
to broad social or environmental problems, in which a number of departmen
and schools participate.

This Office is responsible for coordinating activities of the Program of Polic
Studies in Science and Technology with other policy-oriented projects and pro
grams within the University.

PROGRAM OF POLICY STUDIES IN SCIENCE AND TECHNOLOGY

The primary objective of the Program of Policy Studies in Science an
Technology is to encourage the continuing development of a University polic
research capability directed toward the complex issues confronting society
As an integral part of the University, the Program undertakes to serve as a
organizing element and to provide a neutral forum for the discussion of polic
issues—current and prospective—by representing community groups, and a
an advisory and research resource for policy makers in both public and privat
sectors.

Activities of the Program reflect a number of ways in which a wide range o
interdisciplinary talents can be brought to bear upon the analysis of polic

problems, particularly those involving the impact of advancing technology on the processes, values, and institutions of society.

By means of the Program of Policy Studies in Science and Technology, George Washington University is moving toward an institutional approach to the policy analysis function as contrasted with the highly fragmented and largely uncoordinated pattern of "institutes," "centers," and "study groups" which exists at most universities. The Program of Policy Studies concept is novel in its attempt to provide an organization that strengthens the University's ability to address itself to broad issues of public policy. This approach envisages a continuing interaction among the professional staffs of the Program of Policy Studies in Science and Technology, other policy research groups, and other faculty members of the schools and departments of the University.

The following are the primary study areas of the Program:

1. The structure and functions of institutions designed to stimulate, utilize, regulate, and appraise the application of science and technology to the achievement of basic community goals, and to society's needs, national and international.

2. The application of modern research and development management concepts and skills to the planning, programming, and managing of governmental programs and urban social problem areas.

The Program has also undertaken to bring into focus the courses and seminars offered by the University which are directly related to the interface area of science, society, and public policy. An announcement is published every fall.

The Program supports or conducts a number of activities, including studies, monographs, special reports, and professional seminars with government, industry, policy research, and university representatives. An Annual Report of current activities is published in the fall.

Funding sources for the Program of Policy Studies in Science and Technology include, in addition to the University, a basic institutional grant from NASA and grants and contracts from other sources such as the Environmental Protection Agency, the Federal Highway Administration (Department of Transportation), the Office of Education and the Public Health Service (Department of Health, Education, and Welfare), the Department of State, the Department of Housing and Urban Development, the Russell Sage Foundation, the National Science Foundation, the Ford Foundation, and the Cogar Foundation.

PROFESSIONAL STAFF*

Director: Louis H. Mayo, *Vice President for Policy Studies and Special Projects; Professor of Law*

James G. Abert, *Senior Research Scientist (Economics, Engineering, Systems Analysis)*

Betsy Amin-Arsala, *Research Associate (Community Development)*

Michael A. Bass, *Research Assistant, Science, Technology, and Public Policy Project*

Guy Black, *Senior Staff Scientist; Professor of Business Economics*

Dennis W. Brezina, *Senior Staff Scientist (Political Science)*

* Staff listing consists of members who allocate all or a substantial portion of their effort to Program activities. Directors and members of the staffs of other policy study groups in the University also participate in the various seminar series, conferences, and other activities of the Program.

James M. Brown, *Senior Staff Scientist; Professor of Law*
Vary T. Coates, *Senior Staff Scientist; Director, Technology Assessment Gr*
Deborah Cobin, *Research Assistant, NSF Office of International Programs*
Steven Ebbin, *Senior Staff Scientist; Director, Environmental Policy St*
Group
Robert F. Ehrhardt, *Research Assistant, Science, Technology, and Public Po*
Project
Richard F. Ericson, *Senior Staff Scientist; Professor of Management*
Ann B. Finkelstein, *Research Associate (Sociology); Assistant Director, Co*
Education Fellowship Project
Joseph V. Foa, *Professor of Engineering and Applied Science*
Mark S. Frankel, *Assistant to the Director, Science, Technology, and Pub*
Policy Project
Joanne Gorman, *Research Assistant, Science, Technology, and Public Po*
Project
John Hanessian, Jr., *Senior Staff Scientist; NSF, Office of Exploratory Resea*
and Problem Assessment, Personnel Mobility Assignment
Audrey D. Hassanein, *Research Information Specialist*
Guenther Hintze, *Research Professor of Electrical Engineering*
Mary A. Holman, *Associate Professor of Economics*
Rodney Huff, *Research Associate; James E. Webb Fellow in Science, Tec*
nology, and Public Policy
George E. Humphries, *Consultant (Business Administration)*
Raphael G. Kasper, *Research Scientist (Nuclear Engineering); Associate D*
rector, Environmental Policy Study Group
Margery Kemper, *Research Assistant, Educational Policy Group*
Gerald J. Kluempke, *Executive Secretary, President's National Advisory Co*
cil on Supplementary Centers and Services (Educational Policy Group)
John M. Logsdon, *Research Scientist; Director, Science, Technology, and Pub*
Policy Project; Associate Professor of Public Affairs and Political Science
Joseph B. Margolin, *Senior Staff Scientist; Director, Educational Policy Gro*
Milton C. Marney, *Senior Research Fellow; Normative Systems Researc*
Integrative Basis for Urban Studies Project
Roy L. Marx, *Research Scientist (Economics), Ford Energy Policy Project*
Marion R. Misch, *Research Scientist; Deputy Director, Educational Poli*
Group
Judith Naiman, *Research Assistant, Educational Policy Group*
Howard C. Reese, *Consultant (Government)*
Richard Rice, *Research Assistant, Law*
Virginia Robinson, *Research Associate, President's National Advisory Coun*
on Supplementary Centers and Services (Educational Policy Group)
Judith Russell, *Chief Information Specialist, NSF R&D Innovation, Informatio*
and Analysis Project
Nozer D. Singpurwalla, *Associate Professor of Operations Research*
Charles T. Stewart, Jr., *Professor of Economics*
Edward D. Studholme, *Research Associate (Urban and Regional Planning)*
Theodore Suranyi-Unger, Jr., *Senior Staff Scientist (Economics); Research Pro*
fessor of Economics
Stephen F. Szabo, *Research Assistant (Political Science)*
Wesley L. Tennant, *Senior Staff Scientist; Manager, NSF R&D Innovation, In*
formation, and Analysis Project

David L. Wald, *Research Assistant, Science, Technology, and Public Policy Project*
Frederick B. Wood, *Research Associate (Management)*
Saul Yanofsky, *Research Associate, President's National Advisory Council on Supplementary Centers and Services (Educational Policy Group)*

ADVISORY COMMITTEE

Chairman: Lloyd H. Elliott, *President, George Washington University*
Vice Chairman: Bernard A. Schriever, *Chairman of the Board, Schriever & McKee, Inc., Washington, D.C.*
Harold F. Bright, *Provost and Vice President for Academic Affairs, George Washington University*
Arthur E. Burns, *Dean, Graduate School of Arts and Sciences, George Washington University*
Joseph L. Fisher, *President, Resources for the Future, Inc., Washington, D.C.*
Dwight Waldo, *Albert Schweitzer Professor in the Humanities, Syracuse University*
Reuben E. Wood, *Professor of Chemistry, George Washington University*

INSTITUTE FOR EDUCATIONAL LEADERSHIP

Norman Drachler, *Director, Institute for Educational Leadership*
Samuel Halperin, *Director, Educational Staff Seminar*
Michael O'Keefe, *Director, Washington Internships in Education*
Judith K. Miller, *Director, Health Staff Seminar*
Michael Usdan, *Coordinator, Associates Program*
Stephen K. Bailey, *1972-73 Scholar-in-Residence*
Jonathan Brown, *Assistant Director, Educational Staff Seminar*
James Lake, *Assistant Director, Washington Internships in Education*

The Institute for Educational Leadership of George Washington University was established to meet the need for strengthening existing and potential leadership in American education at all levels of policy formulation and administration. The emphasis is on improving the quality of decision-makers by providing current and promising educational leaders with first-hand experiences as participants in key issues confronting education today.

The selection of promising and highly qualified individuals to take part in various activities is of crucial concern to the Institute. Criteria for selection emphasize performance in leadership situations. In carrying out its selection and training functions, the Institute is adaptive in its approach, continuously testing the efficacy of alternative methods of leadership development.

The objectives of the Institute are carried out under programs and activities of the following types:

1. *Washington Internships in Education* (WIE) with additional participation at several state levels. Each year WIE and its sponsors from public and private agencies bring together a group of young people from widely diverse backgrounds who share the goal of improving American education. WIE interns are given the opportunity to work and study for a year in a unique and

intensive learning environment. The program is designed to help them thi
policy terms about national and state issues and their relationship to educat
and human goals, to become more sophisticated in dealing with the proc
of decision-making, and to become more familiar with the structures and
cedures of large organizations.

2. *Educational Staff Seminar* (ESS) and the extension of activities a
state level. ESS is designed to assist professional staff members in the fie
education, employed by both the executive and legislative branches of the
eral government, in obtaining more realistic understanding of actual educati
practices and problems, and to improve communications between Washing
educational staff members and educators in the field. ESS seeks this increa
staff understanding and awareness of contemporary problems in American e
cation through a variety of in-service training seminars and in-the-field p
sonal observations. Emphasis is on developing broad educational understand
and perspective as well as providing wide exposure to current educatio
problems.

3. *Institute Associates* are appointed from selected faculty and administra
staff members of institutions of higher education and staff members of ed
community organizations. They serve as technical advisers on educational poli
development with congressional and state legislative committees, executi
agencies, commissions and councils, and appropriate nongovernmental agencie
The program provides the various policy-makers with expert help in formulati
proposals and gives Associates direct and immediate experience in the formu
tion of educational policy.

4. *Scholars-in-Residence*. A select group of individuals of national prom
nence and professional distinction are invited to occupy chairs of educatio
leadership development. Scholars act as advisers-in-residence to participants
the WIE, ESS, Associates, and other Institute programs and contribute to int
disciplinary areas of educational thought and leadership.

5. *Health Staff Seminar* (HSS) is designed to assist professional staff me
bers employed by the executive and legislative branches of the federal gover
ment in the field of health to obtain a more realistic understanding of actu
health practices and problems, and to improve communications between Wash
ington-based professional staff members and practitioners in the field. The pro
gram provides participants with a variety of opportunities to explore new con
cepts and to examine critical issues in detail. In addition, HSS provides staf
aides new opportunities to broaden their perspectives and to gain greater unde
standing of the legislative and policy processes as these pertain to health.

6. *In-service Training Activities*. The Institute also gives emphasis to con
tinuing career development of educational leaders. In accord with this objectiv
the Institute is developing a continuing series of programs and activities fo
the benefit of educational leaders from various institutional settings in both th
public and private sectors and from various levels of policy formulation, im
plementation, and administration. While major attention is focused on the
national scene, every effort will be made to carry these programs of the Insti
tute to regional and state levels.

SPONSORED RESEARCH

Assistant Vice President for Research C.J. Lange

THE RESEARCH PROGRAMS listed in this section are special programs which are established for the specific purpose of attacking in an academic atmosphere problems proposed by the individual projects or submitted by the sponsoring agency. Cooperation between these programs and the various departments of instruction is as close as the nature and needs of the programs and departments will permit.

BIOMETRIC LABORATORY

Director R.R. Bonato

The Biometric Laboratory, established in the fall of 1960 and currently supported by the National Institute of Mental Health grant program, is engaged in a broad spectrum of psychotropic drug assessment. The Laboratory assists investigators throughout the United States in planning research and in analyzing data. The majority of these research projects concern the effects of drugs on behavior.

CENTER FOR MANPOWER POLICY STUDIES

Director Sar A. Levitan

The Center for Manpower Policy Studies is devoted to the evaluation of federally-supported manpower, antipoverty, and related programs. The Center is financed by a grant from the Ford Foundation and offers in conjunction with the Department of Economics graduate courses in labor economics and manpower policy.

EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) CLEARINGHOUSE ON HIGHER EDUCATION

Director C.J. Lange
Associate Director Jonathan Fife

The Educational Resources Information Center (ERIC) Clearinghouse on Higher Education was established in the fall of 1968 with the support of the U.S. Office of Education. The Clearinghouse is responsible for the acquisition,

evaluation, abstracting, indexing, and dissemination of research repo other documents dealing with problems and issues in the field of high cation. It also prepares state-of-the-art and review papers related to education.

INSTITUTE FOR MANAGEMENT SCIENCE AND ENGINEERING

Director W.H. Marlow

The Institute for Management Science and Engineering provides a mult plinary environment for innovative graduate teaching and substantial op nities for research activities and public service under diversified sources ternal support.

The Institute works closely with the University's Program of Policy S in Science and Technology in the application of developing technologi contemporary problem areas. Through its Program in Logistics, the Ins performs research leading to the development of a science in logistics feat principles and methodology for resource allocation problems in civil affairs national defense efforts.

MID-ATLANTIC REGION SPECIAL EDUCATION INSTRUCTIONAL MATERIALS CENTER

Director Robert R. Carter
Principal Investigator R.S. Cottrell, Jr.

The Mid-Atlantic Region Special Education Instructional Materials Ce (MAR-SEIMC) was established in March, 1967, by the Bureau for Educati of the Handicapped, U.S. Office of Education, and George Washington Univ sity to collect, organize, and disseminate information and materials about a for the instruction of handicapped children and youth. Providing assistan in the development of similar centers throughout the Mid-Atlantic Regio (Delaware, the District of Columbia, Maryland, New Jersey, Pennsylvani and Virginia) is a major activity. Workshops are conducted both in the Cent and in the field. MAR-SEIMC is part of a national network of similar cente

NATURAL RESOURCES POLICY CENTER

Director Mary Holman

The Natural Resources Policy Center was established in September, 1965, t sponsor faculty and student research in the area of natural resources and en vironmental quality; to develop and undertake activities that promote unde graduate and graduate education; and to train employees of public resource agencies. The program of the Center focuses particularly on increasing th contribution of the social sciences—economics, planning, and the political s stitutions of natural resource agencies—so that these disciplines and relate fields of knowledge may be brought to bear more fruitfully on contemporary problems relating to the management and development of natural resources The Natural Resources Policy Center, which provides a focus on natural re source and environmental quality problems and issues, is an integral part o the Department of Economics in both the design of its research program and its courses.

OPERATIONAL AND DEMOGRAPHIC ANALYSIS FOR MATERNAL AND CHILD HEALTH CARE PROJECT

Director Margaret Pratt

This Project is concerned with computer-supported research into the maternal and child mortality and prematurity levels of the United States and the socio-economic and health-facilities factors which affect these levels. In addition to this research, the project designs and implements informational and evaluative studies of interest to the sponsoring agency. As part of this effort, the Project publishes a periodical called the *MCH EXCHANGE*, which contains the results of the Project's research and other material of interest to persons concerned with material and child health. The Project is now concerned with an investigation of the basic structure and standards essential to Health Programs Management Information Systems. This Project is operated under a grant from the Maternal and Child Health Service, Health Services and Mental Health Administration, Department of Health, Education, and Welfare.

SOCIAL RESEARCH GROUP

Director I.H. Cisin
Associate Director H.J. Parry

The Social Research Group conducts surveys and experiments with concentration on basic research underlying an approach to the solution of social problems.

COURSES OF INSTRUCTION

ON THE FOLLOWING PAGES OF THIS CATALOGUE, under the alphabetically ranged names of the departments of instruction and special interdepartmen programs, are listed the courses of instruction offered by the University in academic year 1973-74. The courses as here listed are subject to change. University reserves the right to withdraw any course announced.

HOURS OF INSTRUCTION

Classes are scheduled in the morning, afternoon, and evening. Evening daytime sections of the same course are identical, are taught by the same of instructors, and carry the same amount of credit. By taking the evening summer classes and extending the time of study beyond the usual fours years part-time student may complete the requirements and obtain a degree.

EXPLANATION OF COURSE NUMBERS

First-group courses.—Courses numbered from 1 to 100 are planned for dents in the freshman and sophomore years. With the approval of the adv and the dean, they may also be taken by juniors and seniors. In certain stances, they may be taken by graduate students to make up undergradu deficiencies or as prerequisites to advanced courses, but they may not be ta for graduate credit.

Second-group courses.—Courses numbered from 101 to 200 are planned students in the junior and senior years. Except for Accounting courses, th may be taken for graduate credit only upon the approval of the Dean and instructor at the time of registration. Such approval is granted only with provision that students must complete additional work in order to receive gra ate credit. Accounting courses numbered 101-200 may not be taken for gradu credit.

Third-group courses.—Courses numbered from 201 to 300 (in the Gradu School of Arts and Sciences, the School of Government and Business Admin tration, and the School of Public and International Affairs) and courses nu bered 201 to 400 (in the School of Education) are planned primarily for gra ate students. They are open, with the approval of the instructor, to qualified s iors; they are not open to other undergraduates. Qualified seniors in the Sch of Government and Business Administration registering for these courses m

have a 3.00 average, the prior approval of the department chairman who is responsible for the graduate course, and the prior approval of the Dean. Non-degree students who have not completed a Bachelor's degree may not enroll in graduate courses offered by the School of Government and Business Administration.

Fourth-group courses.—Courses numbered 301 to 400 in the Graduate School of Arts and Sciences are limited to graduate students; but they are primarily for doctoral candidates. Courses numbered 301 to 400 in the School of Government and Business Administration are limited to doctoral students. In the School of Education fourth-group courses, numbered 401 to 500, are limited to graduate students with Master's degrees from accredited institutions.

KEY TO ABBREVIATIONS

The following abbreviations are used in this catalogue for course designations and by students in registering for courses.

Acct	Accounting
AmCv	American Civilization
Anat	Anatomy
Anth	Anthropology
Ap S	Applied Science
Art	Art
A Th	Art Therapy
Bioc	Biochemistry
B Sc	Biological Sciences
B Ad	Business Administration
Chem	Chemistry
CE	Civil Engineering
Clas	Classics
Asia	East Asian Languages and Literatures
Econ	Economics
Educ	Education
EE	Electrical Engineering
Engl	English
E Ad	Engineering Administration
Envr	Environmental Studies
Epid	Epidemiology and Environmental Health
Hum	Experimental Humanities
ForS	Forensic Science
Fren	French
Gnet	Genetics
Geog	Geography and Regional Science
Geol	Geology
Germ	Germanic Languages and Literatures
HCA	Health Care Administration
Hist	History
HonP	Honors Program—Columbian College
Ital	Italian
Jour	Journalism
Mgt	Management Science
Math	Mathematics
Micr	Microbiology
Mus	Music
OR	Operations Research
Path	Pathology
Phar	Pharmacology
Phil	Philosophy
PE	Physical Education, Health, and Recreation
Phys	Physics
Phyl	Physiology
P Sc	Political Science
Port	Portuguese
Psyc	Psychology
P Ad	Public Administration
Rel	Religion
SHum	Service-Learning Experimental Humanities
SPSc	Service-Learning Political Science
SSoc	Service-Learning Sociology
Slav	Slavic Languages and Literatures
Soc	Sociology
Span	Spanish
S Ed	Special Education
Sp&D	Speech and Drama
Stat	Statistics
U&RP	Urban and Regional Planning
W St	Women Studies

MESTER HOURS OF CREDIT

he number of semester hours of credit given for the satisfactory completion

of a course is, in most cases, indicated in parentheses after the name of course. Thus, a year course giving 3 hours of credit each semester is mar (3–3), and a semester course giving 3 hours of credit is marked (3). A mester hour usually consists of the completion of one fifty-minute period class work or of one laboratory period a week for one semester.

TIME OF COURSE OFFERINGS

Following most course descriptions is a parenthetical statement listing semester (fall or spring) for which the course is scheduled for 1973-74. term "academic year" is used only with two-semester courses, and indica that the first half of the course is to be offered in the fall semester and second half in the spring semester. If no parenthetical statement appears, course is not scheduled to be offered during the fall or spring semesters 1973-74. Offerings for the summer sessions are not designated in this catalog Students should consult the *Summer Sessions Catalogue* or *Schedule of Class* for summer offerings. A *Schedule of Classes* is also published for each fall spring semester which provides more exact and up-to-date information co cerning the time of course offerings.

Accounting

Professors E.J.B. Lewis, A.J. Mastro *(Chairman)*
Professorial Lecturers M.P. Pujol, A.L. Litke, Raymond Einhorn
Associate Professor F.C. Kurtz, Chei-Min Paik, M.G. Gallagher
Associate Professorial Lecturer Shawki Farag
Assistant Professorial Lecturers R.W. Perkins, E.J. Shuchart

Bachelor of Business Administration in the field of Accounting—See pages 135–
Master of Business Administration with a field of concentration in Accounting
Prerequisite: a Bachelor's degree, see page 145.

Required: the general requirements, pages 145–48. A "common body of knowledge in business administration is required of all candidates; this knowledge may obtained as part of an undergraduate degree in business or as part of the Master of Business Administration degree program at this University. The "common body of knowledge" may be satisfied by the following courses at this University or the equivalent: Acct 115; B Ad 102, 131, 141, 161, 181, 198; Econ 121; Mgt 1 and Stat 111. In addition to this requirement the student's program of study consist of (1) the "Required Courses in Administration," including Acct 276 (pages 147–48); (2) Acct 262, 295, B Ad 231; (3) (a) for students not electing a thesis—Acct 275, 282, 297, and 6 semester hours of elective, or (b) for students electing a thesis—Acct 275 or 282, and Acct 299, 300, and 6 semester hours of elective Acct 215 must be taken in place of Acct 275 or 282 if a course in cost and bud getary control was not taken prior to entering the M.B.A. degree program. Elective courses are selected, with the approval of the adviser, from courses in other fields offered by the School; however, no more than 3 hours may be in one field, and none of the courses may be in Accounting.

Programs of study in Accounting leading to the degrees of *Doctor of Business Administration and Doctor of Public Administration.*—See pages 158–60.

Accounting courses numbered below the 200 level may not be taken for graduate credit.

FIRST GROUP

1–2 **Introductory Accounting** (3–3) Gallagher, Kurtz
Basic understanding of accounting concepts, procedures, analyses, and reports; the accounting measurement and communication of significant economic and financial data. Prerequisite to Acct 2: Acct 1. Students who have received credit for Acct 115 cannot receive credit for Acct 1–2. (Acct 1 and 2—fall and spring)

SECOND GROUP

101 **Cost and Budgetary Control** (3)
Cost behavior and volume-profit relationships, responsibility accounting, standard costs, flexible budgets, cost structures for control and motivation, relevant costs, cost concepts. Prerequisite: Acct 1–2. Students who have received credit for Acct 193 or 215 cannot receive credit for Acct 101. (Fall and spring)

111 **Financial Statement Analysis** (3) Farag
Analysis and interpretation of financial statements for the guidance of management, directors, stockholders, and creditors. Prerequisite: Acct 1–2. (Spring)

115 **Survey of Financial Accounting** (3)
Development, presentation, and interpretation of financial accounting data necessary to the management process. Students who have received credit for Acct 1–2 cannot receive credit for Acct 115. (Fall and spring)

121 **Intermediate Accounting** (3) Kurtz
In-depth study of accounting functions and basic theory: acquisition of assets and services, income and equity accounting, preparation and analysis of financial statements. Prerequisite: Acct 1–2. (Fall)

122 **Intermediate Accounting** (3) Kurtz
An in-depth study of special topics: partnership, consignment, installment, liquidation, retail, estate, and trust accounting. Prerequisite: Acct 121.

132 **Accounting Theory** (3) Mastro
Current thought as reflected in the pronouncements of leading professional and accounting research associations, major contributions to accounting literature. Prerequisite: Acct 121. (Spring)

141 **Governmental Accounting** (3) Lewis, Pujol
Appropriation, encumbrance, and fund accounting for governmental and institutional entities. Prerequisite: Acct 1–2. (Fall)

144 **Federal Accounting** (3) Lewis
Accounting procedures in the federal government, with emphasis on agency-level accounts and accounting support for cost-based budgets. Prerequisite: Acct 141.

161 **Federal Income Taxation** (3) Galla

Federal income tax concepts applicable to individuals and corpora differences between tax accounting and financial accounting. (Fal spring)

162 **Tax Research and Planning** (3) Galla

Substantive federal tax provisions relating to corporations, partners security transactions, estates, gifts, and pension and profit-sharing p emphasis on tax research and tax-planning objectives.

171 **Auditing** (3) K

Principles and procedures of auditing: generally accepted auditing st ards, internal control, audit objectives and reports, form-preparation of audit work papers, audit evidence. Prerequisite: Acct 121. (Fa

172 **Audit Planning and Control** (3) K

Standards of audit reporting and other current auditing topics, includ application of statistical sampling techniques to auditing, auditing el tronic systems, and management advisory services. Prerequisite: Acct

181 **Accounting Systems** (3)

Organization and use of accounting information: origination, classifi tion, control, and reporting; development, design, and installation accounting systems; accounting communication patterns. Prerequisi Acct 101, 171. (Spring)

191 **Advanced Accounting** (3) Gallagh

Application of accounting theory to special areas: consolidated st ments, business combinations, earnings per share, foreign exchange, pr level adjusted statements, source and application of funds. Prerequisi Acct 121. (Spring)

193 **Business Budgeting** (3) Lewis, P

Principles and procedures in the development, installation, and operati of a system of budgetary control to aid management. Prerequisite: Ac 1–2. Students who have received credit for Acct 101 cannot rece credit for Acct 193. (Fall and spring)

196 **Management Decisions and Accounting** (3)

Analysis of data required in capital budgeting, inventory manageme and other decisions; cash-flow and probability data; advanced cost a counting systems. Prerequisite: Acct 101.

THIRD GROUP

215 **Survey of Managerial Accounting** (3) Po

Study of the nature, analysis, and interpretation of accounting repo primarily from the management point of view. Prerequisite: Acct 1- or 115. Students who have received credit for Acct 101 cannot rece credit for Acct 215. (Fall and spring)

231 **Contemporary Accounting Theory** (3) Mas

Accounting principles and concepts and recent theories concerned w the valuation and amortization of assets and determination of incom Prerequisite: 6 semester hours of accounting.

241 **Accounting and Related Disciplines** (3) Paik

Interrelationships of accounting and behavioral sciences, economics, mathematical methods, operations research. Prerequisite: 6 semester hours of accounting.

245 **Decision Systems and Accounting** (3) Paik

Limited to students in the Navy Graduate Financial Management Program. Managing financial and related information systems in complex organizations; relationships between accounting in its broadest sense and management control and decision systems. (Spring)

246 **Governmental Accounting and Budgeting Problems** (3) Lewis

Current problems in federal financial planning, programming, budgeting, accounting, and auditing. Prerequisite: Acct 144.

262 **Business Income Taxation** (3) Gallagher

Federal income tax concepts applicable to corporations, partnerships, and their owners; emphasis on tax planning factors in business decisions and tax research. (Fall)

275 **Contemporary Auditing Theory and Procedures** (3) Kurtz

Study of generally accepted auditing standards: internal control and internal auditing, application of statistical sampling to auditing, audit of electronic data processing systems. Prerequisite: Acct 1–2 or 115. (Spring)

276 **Management Planning and Control** (3) Paik

Integrative case study approach to management systems for planning, control, and decisions: value indices for organizational sub-units, transfer pricing, contemporary control systems, accounting framework and cycle. Prerequisite: Acct 1–2 or 115. (Spring)

282 **Accounting Information Systems** (3)

Development and application of accounting system theory, including analysis, design, and implementation. Integration of automatic data processing, accounting systems, and management information systems. Prerequisite: Acct 1–2 or 115. (Spring)

292 **Professional Accounting Review** (3) Lewis

Review and coordination of principles and techniques in preparation for general practice in the field of accountancy and for professional accounting examinations. Prerequisite: Acct 101, 141, 161, 171, and 191.

295 **Seminar in Accounting** (3) Mastro

Selected accounting studies: critical analysis and evaluation developed in seminar discussions and papers. Prerequisite: Acct 1–2 or 115. (Fall and spring)

297 **Accounting Research Methodology** (3) Mastro

299 **Thesis Seminar** (3) Mastro and Staff

(Fall and spring)

300 **Thesis Research** (3) Mastro and Staff

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Mastro and
Limited to students preparing for the Doctor of Business Administra
or Doctor of Public Administration general examination. May be
peated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Mastro and S
Limited to Doctor of Business Administration or Doctor of Public
ministration candidates. May be repeated for credit. (Fall and spri

American Literature

See "English."

American Studies Program

Professors R.H. Walker, Jr., C.C. Mondale
Associate Professor Letitia Brown
Assistant Professors H.F. Gillette, Jr., B.M. Mergen *(Director)*
Adjunct Assistant Professor R.S. French
Special Lecturer Lillian Miller

FACULTY ADVISORY COMMITTEE

B.M. Mergen *(Chairman)*, C.W. Cole, C.E. Galbreath, F.S. Grubar, H.L. L
Blanc, C.H. Pfuntner, R.P. Sharkey, R.W. Stephens, Dewey Wallace, Jr.

AMERICAN STUDIES COUNCIL

The Council serves the American Studies Program in an advisory capacity
from several points of view, as follows:

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Sterling Tucker, *Vice Chairman, District of Columbia Council*

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From the Alumni

C. Robert Kemble

From Affiliated Programs

Robert H. Land (Library of Congress)
Atlee Schidler (Washington Center for Metropolitan Studies)
Wilcomb E. Washburn (Smithsonian Institution)

From the Faculty

The American Studies staff of instruction and the Faculty Advisory Committee, ex officio

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Bachelor of Arts with a major in American Civilization (Field-of-Study).—The following requirements must be fulfilled.

1. The general requirements stated on pages 74–75, 82–87.
2. Prerequisite course—AmCv 71–72. (In preparation for the major field it is recommended that students elect introductory courses in Anthropology, Art, Economics, English, Geography and Regional Science, History, Philosophy, Political Science, Religion, and Sociology.)
3. Required courses in the major—(a) 15 semester hours of approved second-group courses in the Humanities (History may be elected for (a) or (b), but not for both); (b) 15 semester hours of approved second-group courses in Social Studies; (c) AmCv 179–80, which must be taken in the senior year.
4. In addition to the "meaningful initiation" requirement (see page 75), students must elect 3 or 4 additional semester hours in the Natural and Mathematical Sciences or in Geography and Regional Science.

The major examination required of all seniors must be satisfactorily completed in the first semester of the final year.

Two years of a foreign language or adequate preparation in statistics, logic, or linguistics is strongly recommended. Students should consult frequently with an American Civilization adviser.

Master of Arts in the field of American Civilization.—Prerequisite: the degree of Bachelor of Arts with an undergraduate major in American Civilization or in the subject in which concentration is contemplated.

Required: the general requirements, pages 92–99, including (1) AmCv 271-72 (6 semester hours), a seminar in the methods and materials for teaching and research in American Civilization; (2) 18 additional semester hours in a carefully related pattern, focusing on a concentrated approach to the study of American Civilization; (3) a Master's thesis (6 semester hours) written on an approved topic under the direction of the instructor in whose field the major emphasis falls; (4) a Master's Comprehensive Examination reflecting the candidate's area of concentration.

Doctor of Philosophy in the field of American Civilization.—This program combines work in the humanities and/or social sciences as preparation for research and teaching, with the option of stressing preparation for museum and library careers. Applicants are required to have an adequate background in the humanities and/or social sciences as they apply to the understanding of American civilization.

Required: the general requirements, pages 92–96, 99–101. Candidates must pass a General Examination in four areas. An area in American Cultural History and an area in the culture of some area outside the United States (i.e., English Literature, European History) are required. The other two areas may be chosen from the following groups: (1) American Diplomatic, Economic, Political, or Social History; American Literature, Art, Philosophy, or Religion; Afro-American History; or some areas of the social and behavioral sciences; (2) in affiliation with the Library of Congress—supervised historical study in bibliographic resources including American History and Politics, Cartography, Cross-cultural Studies, Government Documents, Graphic Arts and Music, Motion Pictures and Recorded Sound, Printing and Book-

making; (3) in affiliation with the Smithsonian Institution (Museum of History Technology, National Portrait Gallery, and National Collection of Fine Arts supervised studies including Architectural History, Ethnohistory, Historical Archeology, History of Science, History of Technology, Industrial Archaeology, Mate Aspects of American Civilization, and various fields in the History of Art. A ditional areas of study may be arranged within the University and in both Library of Congress and Smithsonian cooperative programs. Special announcemen concerning these programs are issued periodically and are available in the Office the Director of the American Studies Program.

Research fields for the dissertation may be chosen from any of the above exce those dealing with the culture of an area outside the United States.

AMERICAN CIVILIZATION

FIRST GROUP

71–72 Introduction to American Civilization (3–3) Mergen, Gille
Themes and issues in American civilization since Colonial times, wi emphasis on their contemporary importance. (Academic year)

SECOND GROUP

161–62 Studies in American Literature (3–3) Ste
Same as Engl 161–62. Major factors in the national cultural tradition s shown by outstanding writers. Prerequisite: Engl 51–52 or 71–72. (Academic year)

179–80 Proseminar in American Civilization (3–3) Gillette, Mergen, Brown, Walke
Coordinating course for seniors majoring in American Civilization. (Academic year)

188 Urban Issues (3) Guthei
Urbanization as a process. Population, life styles, planning, and land (Spring)

***192 The American Cinema** (3) Staf
History and criticism of American films. The course will enable the stu dent to develop an ability to see and evaluate cinema techniques, to ex press the evaluation clearly in writing, and to understand the role of film in the context of American culture.

195 Independent Study (3) Staf
Open to a limited number of American Civilization majors with approval of instructor. (Fall and spring)

THIRD GROUP

271–72 Seminar: Research and Teaching in American Civilization (3–3) Gillett
Consideration of American studies as an area for research and teaching

* Joint offering of the American Studies Program and the Department of Speech and Drama. Stu dents may register under either designation.

introduction to bibliography. Required of candidates for the degree of Master of Arts in the field of American Civilization. (Academic year)

*273–74 **Research Seminar: Materials in American Negro Culture** (3–3) Brown
Prerequisite: Hist 173–74 or equivalent. (Academic year 1973–74 and alternate years)

280 **Seminar: Urban History** (3) Gutheim
(Spring)

281 **Seminar: Early American Literature** (3) McCandlish
Same as Engl 281.

289–90 **Seminar: Topics in American Civilization** (3–3) Mondale
Research problems selected by the instructor. Preparation in American Cultural History or other area appropriate to the topic of the seminar. (Academic year)

295 **Independent Study** (arr.) Staff
Limited to Master's candidates. Permission of instructor, in writing, required. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

*373–74 **Readings on the Negro in American Culture** (3–3) Brown
For students preparing for the Doctor of Philosophy general examination in the field of the Negro in American Culture. (Academic year 1974–75 and alternate years)

379–80 **Readings in American Cultural History** (3–3) Mergen, Walker
For students preparing for the Doctor of Philosophy general examination in the field of American Civilization. (Academic year)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

COURSES OFFERED IN AFFILIATION WITH THE LIBRARY OF CONGRESS

The Graduate School of Arts and Sciences is affiliated with the Library of Congress in a program leading to the degree of Doctor of Philosophy. The following courses are offered at the Library of Congress by members of its staff:

* Joint offering of the Department of History and the American Studies Program. Students may register under either designation.

THIRD GROUP

255–56 **Research Orientation Seminar: Americana in the Library of Congress** (3–3)

Examination of the collections of the Library of Congress with the of increasing understanding of American culture and awareness o brary-oriented research problems and possibilities. For students in affiliated doctoral program, this course may lead directly to a field "Research Materials for the Study of American Life: Their Content, C lection, Arrangement, and Use." (Academic year 1973–74 and al nate years)

FOURTH GROUP

355–56 **Seminar: Advanced Library Research** (3–3)

Introduction to practical problems of research in librarianship and contr of collections. Supervised study in selected subject fields; emphasis o collections in the Library of Congress and concentrated work in a specia collection. Prerequisite: AmCv 255–56. (Academic year)

389 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general exam nation in fields offered in affiliation with the Library of Congress. May be repeated for credit. (Fall and spring)

390 **Dissertation Research** (arr.)

For Doctor of Philosophy candidates preparing dissertations based upon or significantly related to collections of the Library of Congress. Super vised by specialists at the Library. Prerequisite: AmCv 355–56. (Fall and spring)

COURSES OFFERED IN AFFILIATION WITH THE SMITHSONIAN INSTITUTION

The Graduate School of Arts and Sciences is affiliated with the Smithsonian Institu tion's Program for Graduate Students in the History of American Civilization. The following courses are offered at the Museum of History and Technology and at the National Portrait Gallery, by members of its staff:

THIRD GROUP

250 **Orientation Course: Material Aspects of American Civilization** (3)

Familiarization with the historical collections of the Smithsonian Institu tion and introduction to opportunities for research and publication based on historical objects. Required of all students in the Master's and doc toral programs affiliated with the Smithsonian Institution. (Fall)

*284 **Seminar: Studies in American Art and History** (3) Miller

Exploration of selected problems and themes in American cultural history involving the use of artistic materials in different media; emphasis on methodology and analytic techniques. (Spring)

* Joint offering of the Department of Art and the American Studies Program. Students may register under either designation.

*294 **Field Research in Historical Archaeology** (3)

Field techniques, including excavation, recording, photography, preservation, laboratory analysis and interpretation, supplemented by seminars on the history, ethnography, and ethnohistory of 17th century St. Mary's City, Md.

FOURTH GROUP

351–52 **Research in Selected Aspects of American Civilization** (3–3)

Supervised study and/or field work in selected subject areas related to the activities of the Smithsonian Institution. Prerequisite: AmCv 250. (Academic year)

394 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination in fields offered in affiliation with the Smithsonian Institution. May be repeated for credit. (Fall and spring)

395 **Dissertation Research** (arr.)

For Doctor of Philosophy candidates preparing dissertations significantly related to the material aspects of American civilization. Students work under curatorial supervision at the Smithsonian Institution. Prerequisite: AmCv 351–52. May be repeated for credit. (Fall and spring)

Anatomy

Professors C.M. Goss *(Visiting—Medical History)*, F.D. Allan, T.N. Johnson, R.S. Snell *(Chairman)*
Professorial Lecturers J.L. Angel, T.S. Reese
Associate Professors J.B. Christensen, E.N. Albert
Associate Clinical Professor R.N. Brown
Associate Professorial Lecturers J.A. Di Paolo, Joan Blanchette-Mackie
Assistant Professor Marilyn Koering

Doctor of Philosophy in the field of Anatomy.—Required: the general requirements, pages 92–96, 99–101. Candidates must fulfill the tool requirement by passing a reading knowledge examination in French and German or by passing the examination in one of these languages and satisfactorily completing the tool requirement in Biostatistics. The General Examination must cover at least four fields, two of which must be in anatomical disciplines.

Research fields: Cell Ultrastructure, Embryology, Gross Anatomy, Histology, Human Genetics, Neuroanatomy, and Physical Anthropology.

202 **Gross Anatomy** (6) Christensen and Staff

Regional dissections of adult cadaver supplemented with lectures and X-rays. Laboratory fee, $30. (Fall)

* Joint offering of the Department of Anthropology and the American Studies Program, in cooperation with St. Mary's College, the Smithsonian Institution, and the St. Mary's (Md.) City Commission.

203 **Human Embryology** (1)

Origin and development of human body; emphasis on value of emb
ogy in interpreting anatomical anomalies. (Fall)

204 **Neuroanatomy** (2) Johnson and

Gross and microscopic anatomy of central nervous system and sp
senses. Laboratory fee, $13. (Fall)

205 **Microscopic Anatomy** (3) Albert and S

Microscopic structure of cells, tissues, and organs of the human b
Laboratory fee, $13. (Fall)

221–22 **Seminar** (1–1) Koer

Research reports and discussions of special topics by staff and gradu
students. (Academic year)

249 **Introduction to Anatomical Research** (1) St

Major research techniques as applied to biological materials in the va
ous anatomical disciplines. (Fall)

252 **Physical Anthropology** (1) Ang

Variations in man and factors affecting him, human evolution and rac
differences, anatomy and culture of ancient man. (Spring)

254 **Fetal Anatomy** (2) Alb

Dissection of early and late human fetus. Comparison of fetal and adu
structures. 20 students. Laboratory fee, $10. (Spring)

256 **Human Genetics** (1) C.B. Jacobs

General principles of genetics, new cytogenetics techniques, aneuploidy
man and its significance, biochemical aspects of heredity, genetic couns
ing. (Spring)

258 **Cytology** (3) Albert and Sta

Detailed study of morphology and function of the cell and its organelle
Basic cytological techniques emphasized. Laboratory fee, $20. (Spring

260 **Electron Microscopy in Cellular Biology—Lecture** (1) Koeri

Introduction to the morphology of the cell and its components.
(Spring)

261 **Electron Microscopy in Cellular Biology—Laboratory** (2) Koeri

Prerequisite or concurrent registration: Anat 260. Introduction to th
routine processing of specimens; preparation and interpretation of micro
graphs. Limited enrollment. Admission by permission of instructor. Labora
tory fee, $15. (Spring)

262 **Gross Anatomy of Upper and Lower Extremities** (2) Christensen and Sta

Detailed dissection, supplemented by X-ray anatomy; discussions, assigne
reading. 24 students. Laboratory fee, $10. (Spring)

264 **Gross Anatomy of Head and Neck** (2) Christense

Detailed dissection, supplemented by X-ray anatomy; discussions, assigne
reading. 24 students. Laboratory fee, $10. (Spring)

266 **Gross Anatomy of Thorax and Abdomen** (2) Christensen
Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. 24 students. Laboratory fee, $10. (Spring)

268 **Gross Anatomy of Pelvis, Perineum, and Lower Extremity** (2) Christensen and Staff
Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. 24 students. Laboratory fee, $10 (Spring)

270 **Dissection of the Human Brain** (1) Johnson
Dissection of major pathways and nuclei of the brain with consideration of ventricular system; conferences and assigned reading. 20 students. Laboratory fee, $10. (Spring)

272 **Autonomic Nervous System** (1) Allan
Development, microscopic and gross anatomy, function of central and peripheral components of autonomic nervous system. (Spring)

274 **Tissues of the Body** (1) Snell
Selected tissues of the human body considered in depth.

276 **Advanced Studies in Anatomy** (1) Staff
Lectures and conferences on selected anatomical subspecialties—endocrinology, teratology, growth, etc. May be repeated for credit. (Spring)

278 **History of Anatomy and Surgery** (1) Goss
Lectures and discussions related particularly to the lives and times of outstanding contributors to the advancement of the science of anatomy and surgery. (Spring)

288 **Surface Anatomy and Radiology** (1) Snell
Lectures and demonstrations on areas of clinical importance.

295 **Research** (arr.) Staff
Content differs each time course is offered; may be repeated once for credit. Fee to be arranged. (Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Anthropology

Professor R.K. Lewis
Professorial Lecturers J.L. Angel, Ruth McKay
Associate Professors R.L. Humphrey, Jr. *(Chairman)*, Ruth Krulfeld

Associate Professorial Lecturer Gilbert Wright
Asssitant Professors V.K. Golla, Suzanne Simons, Alison Brooks
Assistant Professorial Lecturer George Stuart

Bachelor of Arts with a major in Anthropology (Departmental).—The follow requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87.
2. Prerequisite course—Anth 1–2.
3. Required courses in other areas—(a) 12 semester hours, or equivalent, introductory French, German, Russian, or Spanish (or another major language proved by the Department of Anthropology); (b) 6 to 12 semester hours of cou work in related departments. Recommended for ethnological emphasis are cours in Economics, Political Science, Psychology, and Sociology; for archaeological e phasis, courses in American Civilization, Art History, Geography and Regiona Science, Geology, and History; for emphasis in physical anthropology, courses Anatomy and Biological Sciences. Statistics is strongly recommended for all Anthr pology majors.
4. Requirements for the major—24 to 30 semester hours in Anthropology course including Anth 192 and second-group courses in each of the following categories Aspects of Culture (courses numbered in the 150's), Linguistics (courses numbered in the 160's), Ethnology (courses numbered in the 170's), and Physical Anthro pology or Archaeology (courses numbered in the 180's). Qualified seniors may enro in 200-level courses with permission of the instructor. Up to 6 semester hours o ethnographic or archaeological field school credit may be accepted and applied toward the major with the approval of the Department, and majors are encouraged t participate in such summer programs offered here or elsewhere. Opportunities fo field and laboratory research participation are also periodically available to ex ceptionally able students both with staff members conducting research and at on of the several excellent anthropological museum facilities in the area. Credit fo such work may be granted through registration for Anth 195.

Bachelor of Arts with a major in Classical Archaeology and Anthropology (De partmental).—An interdepartmental major offered by the departments of Anthro pology and Art. The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should con sult a departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Natural and Mathematical Sciences.)
2. Prerequisite course—Anth 1–2.
3. Required courses in the major—Anth 152, 158, 177, 183; Art 101, 102, 103 111; Hist 109, 110. (A reading knowledge of French and German is recommended.)

Master of Arts in the field of Anthropology.—Prerequisite: a Bachelor of Arts de gree with a major in Anthropology from this University, or an equivalent degree.

Required: the general requirements, pages 92–99. The minimum requirement consists of 24 semester hours of Anthropology courses plus a thesis (equivalent to 6 semester hours). A thesis is preferred; however, under certain circumstances, with the approval of the Department, students may elect a program of study consisting of 30 to 36 semester hours of Anthropology courses without a thesis. There are no specific required courses; however, the student's program must cover the major areas of anthropological interest which have been approved in advance by the Department graduate adviser. A reading knowledge examination in one foreign language must be passed before beginning the third semester of graduate work. Students who are writing a thesis must take the Master's Comprehensive Examination before registration for the second half of thesis work.

A specialized program in Anthropological Museology, including research at the Smithsonian Institution and a limited number of internships at the Textile Museum, is available to selected students.

Departmental prerequisite: Anth 1–2 is prerequisite to all other courses in Anthropology except Anth 158 and 162. This prerequisite may be waived by permission of instructor.

FIRST GROUP

1–2 **Introductory Anthropology** (3–3) Staff

Anth 1: survey of man's origin, physical evolution, and culture history. Anth 2: survey of the world's cultures, illustrating the principles of cultural behavior. (Anth 1 and 2—fall and spring)

SECOND GROUP

150 **Comparative Value Systems** (3) Krulfeld

Examination of world views, conceptual systems, and value orientations of representative cultures throughout the world. (Fall 1973 and alternate falls)

151 **Primitive Economics** (3) Krulfeld

Comparative study of various economic organizations, including hunters and gatherers, herders and cultivators.

152 **Man, Culture, and Environment** (3) Humphrey

Basic principles of cultural ecology. Man's interaction with the ecosystem both past and present; emphasis on the application of anthropological precepts to current environmental problems. (Fall 1974 and alternate falls)

153 **Psychological Anthropology** (3) McKay

Relevance of psychological theories to human evolution and the cross-cultural study of personality. Cultural determinants of personality formation and mental health. (Fall)

154 **Mythology and Folklore** (3) Golla

Traditional verbal expression of supernatural or social beliefs; metaphorical thought; verbal art. (Fall)

155 **Primitive Religion** (3) Simons

Conceptions of the supernatural in nonliterate societies. Examination of religious beliefs and practices. Emphasis on states of consciousness. (Spring 1974 and alternate springs)

156 **Comparative Political and Legal Systems** (3) Simons

Cross-cultural study of ancient and modern systems of social control; moral, ethical, and legal factors which operate to produce behavioral norms. (Spring 1975 and alternate springs)

157 **Primitive Social Organization** (3) Simons

The analysis of the social organization of primitive peoples; kinship, economic, and political systems. (Fall)

158 **Art and Culture** (3) Krulfeld

Study of the art of tribal society, including the role of art in culture, influences upon the artist, and beliefs and practices associated with art production. (Fall or spring)

159 **Ethnography of Knowledge** (3) Gol
(*Formerly Ethnoscience*)
The organization of empirical knowledge in literate and nonliterate socie
ties. Processes of hypothesis, deduction, and classification. (Fall 197
and alternate falls)

161 **Language and Culture** (3) Gol
Structure and semantics of systems of human communication; linguistic
change; social aspects of language. (Fall)

162 **Linguistics in Anthropology** (3) Gol
Introduction to general (descriptive and comparative) linguistics.
(Spring)

170 **Cultures of the Caribbean** (3) Lew
Study of the culture history and ways of life of the various cultural group
of the area up to the ethnographic present. (Spring 1974 and alternat
springs)

171 **Native Peoples of North America** (3) Simons, Humphre
Comparative study of Indian groups representative of each of the culture
areas of the continent. (Spring 1975 and alternate springs)

172 **Native Peoples of South America** (3) Stua
Survey of Indian groups representative of each of the culture areas of the
continent. Hacienda, plantation, and urban adaptations of Indian and
African groups. (Fall 1974 and alternate falls)

173 **Cultures of the Pacific** (3) Lew
Study of the culture history and ways of life of the native peoples of
Melanesia, Micronesia, and Polynesia. (Fall 1974 and alternate falls)

174 **Far Eastern Communities** (3) Krulfeld
Study of social organizations, religions, economies, and problems of cur
rent anthropological interest for cultures of the Far East, including Ja
pan, Korea, China, and India. (Spring 1975 and alternate springs)

175 **Cultures of Southeast Asia** (3) Krulfeld
Study of representative Southeast Asian cultures from primitive groups to
high civilizations. (Fall 1973 and alternate falls)

176 **Cultures of the Circumpolar Region** (3) Humphrey
Survey of the social and economic adaptations to an extreme climate
made by peoples of the northern subarctic and arctic regions of North
America and Eurasia. (Spring)

177 **Cultures of the Near East** (3) Lew
Study of the geographic environment, language, religion, and social struc
ture of settled and nomadic peoples of the Near East; emphasis on the
Arab world. (Spring 1975 and alternate springs)

178 **Cultures of South and East Africa** (3) Lew
Comparative examination of the history, cultural development, and con
temporary problems of cultures of southern and eastern Negro Africa.
(Fall 1973 and alternate falls)

179 **Cultures of West and Central Africa** (3) Lewis

Comparative examination of the history, cultural development, and contemporary problems of cultures of western and central Negro Africa. (Spring)

182 **New World Archaeology** (3) Humphrey

Survey of North American culture history from man's entry into the Americas during the Pleistocene period until the time of the first European contacts. (Spring)

183 **Old World Archaeology** (3) Brooks

Specific area and periods to be announced in the *Schedule of Classes*. Survey of human prehistory in Europe, Africa, and Asia from the earliest hominid cultures to the beginnings of advanced civilizations and their secondary centers. May be repeated for credit with permission of instructor. (Fall)

184 **Ethnohistory** (3) Stuart

Cultural reconstruction of behavioral and ideological patterns of past societies. Specific cultural area to be announced in the *Schedule of Classes*.

185 **Latin American Archaeology** (3) Humphrey, Stuart

The culture history of pre-Columbian Mexico and Central America from the Paleo-Indian period through the Spanish Conquest, emphasizing the origin and development of Latin American high civilizations. (Spring 1975 and alternate springs)

186 **Physical Anthropology of Modern Man** (3) Angel

(Formerly Physical Anthropology)

Individual and social biology, methods and techniques. Genetic, cultural, and ecologic backgrounds of individual and population variation: microevolution, growth, paleodemography, paleopathology, forensic identification, techniques. (Spring)

187 **Introduction to Hominid Evolution** (3) Brooks

The fossil record of hominid evolution considered in the light of evolutionary theory. Brief review of the earlier antecedents of man, with concentration on the Pleistocene remains. (Spring 1975 and alternate springs)

188 **Primatology and Primate Social Behavior** (3) Brooks

Physical and behavioral characteristics of the various primate groups and their relationship to human physical and cultural evolution. Frequent meetings at the National Zoological Park. (Fall 1973 and alternate falls)

192 **Anthropological Theory** (3) Krulfeld

Analysis of the theoretical postulates and assumptions underlying the development of modern cultural anthropology. (Fall and spring)

193 **Anthropological Methods** (3) Krulfeld, Lewis

Approaches to library and field research. Conceptual bases and bias in the delineation of problems; in the selection, analysis, and organization of data; and in the preparation of the final report. (Fall 1974 and alternate falls)

195 **Undergraduate Research** (arr.)
Individual research problems. May be repeated for credit. (Fall
spring)

THIRD GROUP

202 **Seminar: Recent Trends in Anthropology** (3) Krulfe
Major topics of interest in contemporary anthropology since the mi
20th century will be taken up in order, stressing current journal a
monograph materials. (Fall 1973 and alternate falls)

254 **Seminar: Folklore in America** (6)
Intensive seminar covering the various aspects of American tradition
culture, including the theory and methodology of folklore research. P
mary emphasis on Anglo- and Afro-American traditional cultures, w
some consideration of other ethnic groups.

261 **Seminar: Anthropological Linguistics** (3) Gol
Anthropological study of language—dialectology, ethnosemantics, descri
tive and comparative studies of exotic languages.

262 **Seminar: Applied Anthropology** (3) Stal
Use of anthropological methods and techniques in such specific fields a
government, community development, land reform, law, and medicin
(Spring)

263 **Seminar: Culture Contact and Change** (3) Simon
Western impact on non-Western cultures. Workings and processes o
social change as variant cultures and ethical systems interact. (Fa
1974 and alternate falls)

264 **Seminar: Museum Techniques** (3) Humphre
Principles of anthropological collection, classification, preservation, ident
fication, interpretation, and exhibition of specimens; research and instru
tional use of the museum. Field trips to area museums. (Fall)

265 **Seminar: Method and Theory in Archaeology** (3) Humphrey, Brook
Analysis of field techniques, dating methods, and theoretical approache
in reconstructing and interpreting the cultures of the past, utilizing th
most recent archeological techniques. (Spring)

266 **Seminar: Technology** (3) Humphrey, Lew
Cross-cultural examination of the form, function, meaning, and use o
material culture and the behavior patterns involved in its production
(Spring 1975 and alternate springs)

267 **Seminar: Economic Anthropology** (3) Krulfe
Comparative study of preindustrial systems of production, distribution
and consumption. (Spring)

268 **Seminar: Peasant Society** (3) Krulfe
Cross-cultural analysis of peasant societies, including an examination o
their manner of functioning within their larger social, economic, an
cultural context. (Fall)

269 **Seminar: Structural Problems** (3) Simons

Comparative survey of principles of descent, kinship terminology, and formation of descent groups; problems of variation and change in kinship systems and development of kinship models. (Spring)

272 **Seminar: Topics in Latin American Anthropology** (3) Staff

Research topic selected from among peasant movements, ethnic groups, land reform, urbanization, archeological problems. (Spring)

273 **Seminar: Culture of Poverty** (3)

Cross-cultural consideration of basic assumptions about the life of the poor within pluralistic societies with the aim of gaining theoretical insights into the nature of culture itself. (Spring 1975 and alternate springs)

274 **Seminar: Afro-American Culture** (3) McKay

An ethnographic survey of racial, linguistic, and cultural attributes of Americans of African ancestry. African antecedents, conditions of migration, experiences in slave and free communities over their 350-year history in the United States. (Spring)

282 **Seminar: Advanced Archaeology—North American Prehistory** (3) Humphrey, Stuart

Analysis in depth of current archaeological problems relating to the origin and development of aboriginal American cultures. (Fall)

283 **Seminar: Advanced Archaeology—Old World** (3) Brooks

Study of current archaeological problems in relation to materials from the old world. Specific topics to be announced. (Spring 1974 and alternate springs)

287 **Seminar: Problems in Latin American Civilization** (3) Gordon

Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on some aspects of a selected key theme. Admission by permission of instructor. (Spring)

290 **Advanced Museum Research** (3) Staff

Supervised individual research and/or field work at the Smithsonian Institution, arranged in consultation with the Smithsonian and the Department of Anthropology. Admission by permission of the Chairman of the Department. May be repeated for credit. (Fall and spring)

291 **Seminar: Museology** (3) Wright

Twentieth century development of museums—natural history, science, and history; their history, philosophy, and organization; their civic importance and administrative problems. (Fall)

*294 **Field Research in Historical Archaeology** (3)

Field techniques, including excavation, recording, photography, preservation, laboratory analysis and interpretation, supplemented by seminars on the history, ethnography, and ethnohistory of 17th century St. Mary's City, Md.

* Joint offering of the Department of Anthropology and the American Studies Program, in cooperation with St. Mary's College, the Smithsonian Institution, and the St. Mary's (Md.) City Commission.

295 **Research** (arr.)
May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)
(Fall and spring)

Art

Professors D.C. Kline *(Emeritus)*, W.A. MacDonald, L.P. Leite, F.S. Grube *(Chairman)*, Roland Fleischer
Professorial Lecturers Grace Evans, John Shapley
Associate Professor D.H. Teller
Assistant Professors H.I. Gates, Lilien Hamilton, W.T. Woodward, Fuller Griffith, J.F. Wright, Jr., J.L. Lake
Assistant Professorial Lecturers Jane Kofler, E.L. Battaglia
Instructor Türker Özdoğan
Special Lecturer Lillian Miller
Faculty of the Corcoran School of Art: Roy Slade *(Dean)*, Harold Baskin, Leon Berkowitz, Joe Cameron, William Christenberry, Gene Davis, William Dutterer, Mary Beth Edelson, Eugene Frederick, Tom Green, Samuel Holve Andrew Hudson, Paul Kennedy, Blaine Larson, William Lombardo, E McGowin, Christopher Muhlert, Robert Newmann, Ramon Osuna, Jac Perlmutter, Mark Power, Barbara Price, Kywal Ramkissoon, Paul Rees Paul Salmon, Berthold Schmutzhart, Rona Slade, Robert Stackhouse, A Brockie Stevenson, Joseph Taney, Peter Thomas, Elliott Thompson

Bachelor of Arts with a major in Art History (Departmental).—The followi requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should con sult the departmental adviser regarding courses to be taken in satisfying the require ment for "meaningful initiation" into the Social Studies and the Natural and Mathe matical Sciences.)

2. Prerequisite courses—Art 31–32 or 71–72.

3. Required courses in related areas—Art 137; Fren 1–2, 3–4, or Germ 1–2 3–4; Phil 162; or equivalent. (A reading knowledge of French or German shoul be acquired as soon as possible. Students who plan to do advanced work in Classical Archaeology or Medieval Art are also advised to study Greek and Latin.)

4. Required courses in the major—Art 101 or 102, 104 or 105, 108, 109, 110 112, 113 or 114, 117 or 118; 12 additional semester hours in second-group Art History courses.

Art History majors may apply for graduation with Special Honors. In order to be accepted into this program, students must satisfy the general requirements (pages 48–49). They should apply in writing to the Chairman of the Department of Art at the beginning of their senior year. Before admittance to the program, they must pass a reading examination administered by the Department in either French or German. Upon acceptance, candidates will be assigned to one or more faculty advisers under whose direction they will undertake a supervised program of selected reading on which they will be required to submit written, critical reports.

The Department of Art has established a program of study in affiliation with area private art galleries. This program is open to a limited number of qualified undergraduate students. For details, consult the Chairman of the Department of Art.

Bachelor of Arts with a major in Fine Arts (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)

2. Prerequisite courses—Art 21–22, 41–42 (students concentrating in photography substitute Art 23–24 for 41–42).

3. Required courses in related areas—Art 31–32 or 71–72; 6 additional semester hours in second-group Art History courses.

4. Required courses in the major—27 semester hours of first- or second-group Fine Arts courses in seven areas—Ceramics, Design, Drawing, Graphics, Painting, Photography, and Sculpture. Students choose one of these areas as a primary area of concentration, in which 12 semester hours are required. The remaining 15 semester hours must be distributed among the other areas, but only in the primary area can work taken amount to 12 semester hours. (Transfer students must take at least 12 semester hours of second-group Fine Arts courses in residence at this University, no matter how much advanced standing in Fine Arts is granted upon admission.)

Fine Arts seniors may apply for graduation with Special Honors. In order to be accepted into this program, the student must satisfy the general requirements (see pages 48–49). They should apply in writing to the Chairman of the Department of Art at the beginning of their senior year. Upon acceptance, each candidate will be assigned one or more faculty advisers under whose direction he will complete a project in his special area of interest. Upon completion of the project, the student will present a one-man exhibit prepared exclusively outside of class, subject to the examination of an Honors Board.

Bachelor of Arts with a major in Classical Archaeology and Anthropology (Departmental).—An interdepartmental major offered by the departments of Art and Anthropology. The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should consult a departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Natural and Mathematical Sciences.)

2. Prerequisite course—Anth 1–2.

3. Required courses in the major—Anth 152, 158, 177, 183; Art 101, 102, 103, 111; Hist 109, 110. (A reading knowledge of French and German is recommended.)

Bachelor of Arts with a major in Classical Archaeology and Classics (Departmental).—An interdepartmental major offered by the departments of Art and Classics. The following requirements must be fufilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should consult a departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Natural and Mathematical Sciences.)

2. Prerequisite courses—Clas 1–2, 3, 4; or Clas 11–12, 13, 14.

3. Required courses in the major—Art 101, 102, 103, 111; Hist 109, 110; 14 semester hours of second-group courses in Greek or Latin, including Clas 138. (A reading knowledge of French and German is recommended.)

Master of Arts in the field of Art History.—Prerequisite: a Bachelor of Arts degree with a major in Art History from this University, or an equivalent degree. Applicants from other institutions must present scores on the Graduate Record Examination to the Office of the Graduate School of Arts and Sciences.

1. *With a concentration in Classical Art and Archaeology, American Art, Renaissance and Baroque Art,* and *Contemporary Art.*—Required: the general requirements, pages 92–99. As many as possible of the 24 semester hours of course work should be third-group courses. The courses must be completed in 6 semesters or less, with a grade of *A* in at least 6 semester hours of work, and with an overall quality-point

index of at least 3.25. A reading knowledge examination, preferably in German French, must be passed after completing 9 semester hours of course work. A gene written Master's Comprehensive Examination on the problems in the field of Art H tory and a written thesis (equivalent to 6 semester hours) embodying the result research on some specific topic in the history and theory of art are also required. F details, see the pamphlet on the Master of Arts in the field of Art History, which available in the offices of the Chairman of the Department of Art and the Dean the Graduate School of Arts and Sciences.

2. *With a concentration in Museum Training.*—Required: the general requir ments, pages 92–99. The program of study consists of 36 semester hours of work follows: 12 hours of Art History courses (taken before acceptance to degree ca didacy, see below); Art 201–2, 271–72; and 12 additional hours of Art Histo courses selected in consultation with the adviser. Grades of *A* are required in least two courses, and an overall quality-point index of at least 3.25 must be mai tained. A reading knowledge examination, preferable in German or French, must b passed after completion of 9 semester hours of course work. For details, see th pamphlet on the degree of Master of Arts in the field of Art History, which available in the offices of the Dean of the Graduate School of Arts and Sciences a the Chairman of the Department of Art.

Acceptance in this degree program as a *degree candidate* is provisional, pendi the satisfactory completion of 12 semester hours of graduate Art History cours (this requirement will be counted toward the total semester hours required for th degree). Upon completion of these courses the student must make formal applica tion in writing for *degree candidacy* to the joint George Washington University National Collection of Fine Arts Committee on Museum Training. The applicatio should state the reasons and aims for seeking this degree, and the student shou submit letters of recommendation with the application. A personal interview will als be required.

The Department of Art also has established a program of study in affiliation wit the Textile Museum, the Corcoran Gallery of Art, and area private art galleries. Stu dents wishing to earn graduate credit in this program should consult the Chairman o the Department of Art.

Master of Arts in the field of Classical Archaeology, Classics, and History (a interdepartmental degree program offered by the departments of Art, Classics, an History).—Prerequisite: A Bachelor's degree with a background in Classical Archa ology and either Greek or Latin. Applicants from other institutions must presen scores on the Graduate Record Examination to the Office of the Graduate School of Arts and Sciences.

Required: the general requirements, pages 92–99. The program of study con sists of 24 semester hours of course work (as many as possible should be third group courses) selected in consultation with the appropriate adviser from the de partments of Art, Classics, and History; plus a thesis (equivalent to 6 additional semester hours). Candidates must pass a reading knowledge examination in French or German. All candidates are required to pass a general Master's Comprehensive Examination.

Master of Fine Arts in the field of Ceramics, Design, Graphics, Painting, Photog raphy, or *Sculpture.*—Prerequisite: a Bachelor of Arts degree with a major in Fine Arts in the field of Ceramics, Design, Drawing, Graphics, Painting, Photography, or Sculpture from this University, or an equivalent degree. Students planning to do graduate work in the field of Graphics or Painting must have 12 semester hours of Drawing on the undergraduate level prior to admittance to the Master's degree program.

Required: the general requirements, pages 92–99. In lieu of the foreign language requirement, Master of Fine Arts candidates are required to take 3 additional hours of course work in consultation with the adviser; as many as possible of the remain ing 24 hours of course work should be in third-group courses, only 18 hours o

which may be in one area, the remaining 6 to be selected from related areas in consultation with the adviser. A creative thesis (equivalent to 6 semester hours) in ceramics, design, graphics, painting, photography, or sculpture, and a paper discussing some technical phase of the problem illustrated by the thesis are also required. A representative portion of the work illustrating the creative thesis may be retained by the University at the discretion of the thesis director in agreement with the second reader. For details, see the pamphlet on the Master of Fine Arts degree program, which is available in the offices of the Chairman of the Department of Art and the Dean of the Graduate School of Arts and Sciences.

Bachelor of Arts in Education with a teaching field in Art.—Prerequisite: the Education curriculum, page 78.

Required: the Art option and professional courses listed on pages 109–10, 119.

ART HISTORY

FIRST GROUP

31–32 **Survey of Western Art** (3–3) Hamilton and Staff

Survey of the arts in the Western world from prehistoric to modern times. A foundation for further study in the history of art. (Art 31 and 32—fall and spring)

71–72 **Introduction to the Arts in America** (3–3) Grubar and Staff

Painting, sculpture, and architecture of America, with selected references to crafts and popular arts. Art 71: from Colonial beginnings to the Republican Age. Art 72: from early 19th century to the present. (Art 71 and 72—fall and spring)

SECOND GROUP

101 **Greek and Roman Architecture** (3) MacDonald

(Fall)

102 **Greek and Roman Sculpture** (3) MacDonald

(Spring)

103 **Classical Iconography** (3) MacDonald

Origin and development of myths in classical art.

104 **Renaissance Art in Italy I** (3) Evans, Leite

Early developments from the 13th to the 15th century. (Fall)

105 **Renaissance Art in Italy II** (3) Evans, Leite

High Renaissance and Mannerism. (Spring)

106 **Renaissance Art in the North I** (3) Fleischer

Fifteenth century painting in the Netherlands, Germany, France, and Spain. (Fall)

107 **Renaissance Art in the North II** (3) Fleischer

Sixteenth century painting in the Netherlands, Germany, France, and Spain. (Spring)

108 **18th Century Art in Europe** (3) Fleische
Development of painting, sculpture, and architecture. (Spring)

109 **19th Century Art in Europe** (3) Leite, Hamilto
Painting and sculpture. (Fall and spring)

110 **Contemporary Art** (3) Leite, Hamilto
Painting and sculpture in 20th century Europe. (Fall and spring)

111 **Classical Archaeology** (3) MacDonal
Archaeological monuments of classical civilizations, with intensive stud of one or more areas selected from architecture, sculpture, painting, o minor arts.

112 **Art of Egypt and the Ancient Orient** (3) MacDonal
Study of the art of Mesopotamia, Anatolia, Egypt, and Persia. (Spring)

113 **Baroque Art in Italy** (3) Evans, Leit
Development of painting, sculpture, and architecture in 16th and 17t century Italy. (Spring)

114 **Baroque Art in the North** (3) Fleische
Development of painting, sculpture, and architecture in the 16th and 17t centuries in Holland, Flanders, Spain, France, Germany, and England (Fall)

115 **Christian Iconography** (3) Leit
Origins and development of Christian symbols and themes from earl Christian to modern times.

116 **Islamic Art** (3) Shapley

117 **Medieval Art I** (3) Evans
Architecture, sculpture, and painting of the early Christian and Byzantin periods. (Fall)

118 **Medieval Art II** (3) Evans
Architecture, sculpture, and painting of the Romanesque and Gothic pe riods. (Spring)

119 **Pre-Romanesque Art in the North** (3) Evans
The Carolingian and Merovingian periods. (Spring)

120 **Art of China and Japan** (3) Klin
Architecture, painting, and sculpture of China, Korea, and Japan. (Fall)

145 **Folk Arts in America** (3) Klin
Ceramics, woodcarving, ironwork, decorative painting, weaving, and othe crafts. (Fall)

147 **Pre-Columbian Art** (3) Staf

148 **19th Century American Painting** (3) Grube
(Fall)

149 **19th Century American Sculpture** (3) Grubar
(Spring)

155 **Etruscan Art and Archaeology** (6) MacDonald
Offered off campus through the College of General Studies.

THIRD GROUP

201–2 **Museum Projects** (3–3) Staff
Open only to candidates for the degree of Master of Arts in the field of Museum Training. Practical work to be determined by the Committee on Museum Training at the National Collection of Fine Arts. (Academic year)

*203 **Primitive Art** (3) Kline
Arts of prehistoric and primitive man in Europe, the pre-Columbian Americas, Oceania, and Africa. (Spring)

*207 **Modern Architecture** (3) Kline
Development of modern architecture and building technology in Europe and America from the late 19th century to the present. (Fall)

216 **Medieval Painting** (3) Evans
Painting and the decorative arts.

†220 **Seminar: Baroque Art of the 17th Century** (3) Fleischer, Leite
Specific area annouced in *Schedule of Classes*. A reading knowledge of Italian is desirable for the Italian area and German for the northern area. (Spring)

†221 **Seminar: Renaissance Art** (3) Fleischer, Leite
Specific area announced in *Schedule of Classes*. A reading knowledge of Italian is desirable for the Italian area and German for the northern area. (Fall)

†243 **Seminar: American Art** (3) Grubar
Specific area announced in *Schedule of Classes*. (Fall and spring)

244 **Seminar: 19th Century European Art** (3) Leite
Specific area announced in *Schedule of Classes*. Reading knowledge of French desirable.

245 **Seminar: 20th Century European Art** (3) Leite
Specific area announced in *Schedule of Classes*.

246 **Seminar: Classical Art** (3) MacDonald
Specific area announced in *Schedule of Classes*.

247 **Seminar: Medieval Art** (3) Evans
Specific area announced in *Schedule of Classes*. (Fall)

* May be taken for undergraduate credit with the approval of the instructor.
† May be repeated for credit if the specific area covered is different.

248 **Independent Research** (3)

For Master's degree candidates; open to limited number of qualified undergraduates, with permission. Independent research arranged in consultation with individual instructor and graduate adviser. May be repeated for credit. (Fall and spring)

261 **Seminar: Problems in Art History** (3) Staff

Recommended for Art History majors; open to limited number of qualified undergraduates, with permission of instructor. Theory, criticism, or methodology of art history. May be repeated for credit. Topic to be announced in *Schedule of Classes*. (Fall and spring)

271–72 **Museum Techniques** (3–3) Staff

Open only to candidates for the degree of Master of Arts in the field of Art History with a concentration in Museum Training. Intern training in museum work to be determined by the Committee on Museum Training at the National Collection of Fine Arts. (Academic year—4 hours daily, Monday through Friday)

*284 **Seminar: Studies in American Art and History** (3) Miller

Exploration of selected problems and themes in American cultural history involving the use of artistic materials in different media; emphasis on methodology and analytic techniques. (Spring)

289–90 **Thesis Research** (3–3) Staff

(Fall and spring)

FINE ARTS

Unless otherwise indicated, Fine Arts courses taught in University studios carry no material or laboratory fees; students must purchase their own materials. Laboratory and material fees for courses taught at the Corcoran School of Art are stated in the course description and are payable at the School.

Courses taught at the Corcoran School of Art have the designation "Corcoran Faculty" for the instructor.

Departmental prerequisite: Art 21–22 and 41–42 (students concentrating in photography substitute Art 23–24 for 41–42) or permission of Department Chairman is prerequisite to all other studio courses in Art.

FIRST GROUP

†21–22 **Design I: Basic** (3–3) Staff

Fundamental studies of principles and elements of design. Art 21: study of two-dimensional design. Art 22: three-dimensional studies. (Art 21 and 22—fall and spring)

23–24 **Fundamentals of Photography** (3–3) Lake

Fundamental techniques of photography; emphasis on creative expression. Laboratory fee, $25 a semester. (Art 23 and 24—fall and spring)

* Joint offering of the Department of Art and the American Studies Program in affiliation with the National Portrait Gallery of the Smithsonian Institution. Students may register under either designation.

† Required of all Fine Arts majors.

41–42 **Drawing I** (3–3) Wright

Concepts of drawing, traditional and contemporary; training in perception, analysis of form, use of media, and exercises in connoisseurship. Material and model fee, $15 a semester. (Art 41 and 42—fall and spring)

51–52 **Ceramics I** (3–3) Staff

Working with clay as an art form. Basic techniques of hand building and wheel throwing. Laboratory fee, $45 a semester. (Academic year)

57–58 **Graphics I** (3–3) Griffith, Wright

Exploration of the methods of intaglio, relief, printing, and other composite processes. Material fee, $20 a semester. (Academic year)

61–62 **Water Color** (3–3) Corcoran Faculty

Painting in transparent and opaque water color and in acrylic. Experimentation, figurative and landscape. (Academic year)

65–66 **Painting I** (3–3) Corcoran Faculty

Emphasis on personal expression with exposure to a variety of styles and attitudes. Use of acrylic and oil. (Academic year)

81–82 **Sculpture I** (3–3) Gates

Three-dimensional design. Basic sculptural techniques; modeling, carving, and construction. Media include wood, clay, stone, plaster. Laboratory fee, $15 a semester. (Academic year)

SECOND GROUP

Second-group Art courses may be repeated for credit with approval of Department.

123–24 **Design II: Individual Problems** (3–3) Staff

Emphasis on the individual student and the problems and materials that specifically interest him in any area of design. (Academic year)

*125–26 **Painting II** (3 or 6–3 or 6) Corcoran Faculty

Emphasis on personal expression; exposure to a variety of styles and attitudes. Materials and techniques subordinate to individual experimentation. Use of acrylic and oil. (Academic year)

*127–28 **Painting III** (3 or 6–3 or 6) Woodward

Exploration of problems in developing a personal visual imagery. Material fee each semester: $12 for 3 semester hours; $24 for 6 semester hours. (Academic year)

*131–32 **Ceramics II** (3 or 6–3 or 6) Özdoğan

Development of techniques with emphasis on quality and creativity. Laboratory fee each semester: $45 for 3 semester hours; $60 for 6 semester hours. (Academic year)

135–36 **Advanced Water Color** (3–3) Corcoran Faculty

Development of techniques of water color; concentration on special projects. (Academic year)

* Fine Arts majors and Masters of Fine Arts candidates should elect 6 semester hours of credit.

137 **Workshop in Materials, Methods, and Techniques** (3) Woodwa
Drawing in charcoal, crayon, and pen; painting and preparation o
grounds for tempera, encaustic, fresco buono, oil, water color, polym
and mixed techniques, graphic techniques in woodcut, engraving, etch
ing. Material and model fee, $10. (Fall and spring)

143–44 **Serigraphy** (3–3) Tell
Advanced problems in serigraphy; emphasis on its aesthetic possibilities
Prerequisite: Art 57–58. (Academic year)

*151–52 **Ceramics III** (3 or 6–3 or 6) Özdoğ
Development of techniques with emphasis on quality and creativity. Stu
dents mix own clay and glazes. Laboratory fee each semester: $45 fo
3 semester hours; $60 for 6 semester hours. (Academic year)

*153–54 **Graphics II** (3 or 6–3 or 6) Griffith, Wrig
Advanced relief, intaglio, and other composite processes. Prerequisite
Art 57–58. Material fee each semester: $20 for 3 semester hours; $40 fo
6 semester hours. (Academic year)

*157–58 **Graphics III** (3 or 6–3 or 6) Griffi
Exploration of combined techniques and mixed media. Prerequisite: A
153–54. Material fee each semester: $20 for 3 semester hours; $40 fo
6 semester hours. (Academic year)

159–60 **Drawing II** (3–3) Wrig
Development of drawing. Individual study, application and extensions o
drawing. Material fee, $20 a semester. (Academic year)

163–64 **Design: Visual Communication** (3–3) Corcoran Facul
Layouts and execution in client-presentation form of various graphic de
sign projects—brochures, bookjackets, displays, title graphics for film
media, etc. (Academic year)

171 **Calligraphy** (3) Corcoran Facul
Techniques of hand lettering, traditional and contemporary. Explorati
of the decorative potential in lettering. (Fall)

172 **Typography** (3) Corcoran Facul
Study of type classification, recognition, and adaption. Methods of cop
fitting and type reproduction processes. Typographic layout and specif
cation. (Spring)

174 **Printing and Production** (3) Corcoran Facul
Study of basic printing and production techniques. Preparation of camer
ready copy including line illustration and typography. Influence of m
terials and processes on the character of design and layout. Prerequisite
Art 172.

175–76 **Design Projects** (3–3) Corcoran Facul
Advanced general design problems in two, three, and four dimensions
Unusual media and techniques; pure concept problems stressed. (Ac
demic year)

* Fine Arts majors and Master of Fine Arts candidates should elect 6 semester hours of credit.

177–78 **Survey of Printing and Illustration** (3–3) Corcoran Faculty

Exposure of a maximum range of illustrative processes, both practical and theoretical. Technical aspects of commercial printing processes; methods of preparation of artwork, photographs, and typographic proofs for commercial reproduction. (Academic year)

*179–80 **Sculpture II** (3 or 6–3 or 6) Gates

Concepts of sculpture; new materials and developments. Laboratory fee each semester: $15 for 3 semester hours; $30 for 6 semester hours. (Academic year)

181–82 **Intermediate Photography** (3–3) Lake

Basic problems. Introduction to color photography with emphasis on creative expression. Prerequisite: Art 23–24 or permission of instructor. Laboratory fee, $25 a semester. (Academic year)

185–86 **Painting and Drawing** (3–3) Corcoran Faculty

Techniques of drawing and painting in oil, acrylic, and water color. Work from life model and still life. (Academic year)

*189–90 **Sculpture III** (3 or 6–3 or 6) Gates

Advanced study concentrating on relevance of scale and media. Relationship of sculpture to the environment. Laboratory fee each semester: $15 for 3 semester hours; $30 for 6 semester hours. (Academic year)

193 **Film Making** (3) Corcoran Faculty

Basic techniques and procedures in film making. The student will create his own short film. Laboratory fee, $90. (Fall and spring)

†195 **Documentary Photography** (3) Lake and Staff

Social problems, team-taught. Each student will work on projects with social dimensions. Laboratory fee, $25. Admission by permission of instructor. Limited enrollment. (Spring)

THIRD GROUP

All third-group Art courses may be repeated for credit with the approval of the Department.

205 **Advanced Photography** (3) Lake

Advanced problems in photography; emphasis on individual development. Prerequisite: Art 181–82 or permission of instructor. Laboratory fee, $25. (Fall and spring)

206 **Photography: Special Projects** (3) Lake

Laboratory fee, $25.

208 **Advanced Photography** (3) Corcoran Faculty

Advanced problems in photography; emphasis on individual development. Prerequisite: Art 181–82 or permission of instructor. Laboratory fee, $25. (Fall and spring)

* Fine Arts majors and Master of Fine Arts candidates should elect 6 semester hours of credit.
† Interdepartmental course offered by the departments of Art and Journalism.

*231–32 **Design III** (3 or 6–3 or 6) Gates

New media and techniques in three-dimensional design. Laboratory fee: $15 a semester for 3 semester hours; $30 a semester for 6 semester hours. (Academic year)

*234 **Design IV** (3 or 6) Staff

Presentation, model building, and specifications of materials in three-dimensional problems. (Fall and spring)

*235 **Design V** (3 or 6) Teller

Designing and executing textiles using the techniques of silk screen, block print, and batik. (Fall and spring)

249 **Theory of Design** (3) Teller

Application of design principles to painting, architecture, sculpture, and minor arts of today. Relationship of design principles to the contemporary artist and his work. Open to undergraduate students with permission of instructor. (Fall)

*251–52 **Ceramics IV** (3 or 6–3 or 6) Özdoğan

Development of techniques with emphasis on quality and creativity. Students mix own clay and glazes. Laboratory fee each semester: $45 for 3 semester hours; $60 for 6 semester hours. (Academic year)

*253 **Ceramics V** (3 or 6) Özdoğan

Laboratory fee: $45 for 3 semester hours; $60 for 6 semester hours. (Fall and spring)

*255–56 **Graphics IV: Serigraphy** (3 or 6–3 or 6) Teller

Prerequisite: Art 157–58. (Academic year)

*257–58 **Graphics V: Etching and Engraving** (3 or 6–3 or 6) Griffith

Prerequisite: Art 157–58. Material fee each semester: $20 for 3 semester hours; $40 for 6 semester hours. (Academic year)

*259 **Graphics VI: Lithography** (3 or 6) Wright

(Fall and spring)

*260 **Graphics VII: Relief Printing** (3 or 6) Griffith

Material fee: $20 for 3 semester hours; $40 for 6 semester hours. (Fall and spring)

*265–66 **Painting IV** (3 or 6–3 or 6) Woodward

Creative painting; students work on independent projects as well as assigned problems. Material and model fee each semester: $12 for 3 semester hours; $24 for 6 semester hours. (Academic year)

267–68 **Individual Problems in Photography** (3–3) Lake and Staff

Instruction and professional guidance relevant to individual projects. Laboratory fee, $25 a semester. (Academic year)

*275 **Painting V** (3 or 6) Woodward

(Fall or spring)

* Fine Arts majors and Master of Fine Arts candidates should elect 6 semester hours of credit.

277–78 **Design: Advanced Visual Communication** (6–6) Corcoran Faculty
(*Formerly Art 165–66 Design: Advanced Visual Communication (3–3)*)
Design and execution of graphic design projects, including magazine spreads, posters, advertisements, trademarks, letterheads, packages. Psychological and symbolic aspects of design solutions. (Academic year)

*279–80 **Sculpture IV** (3 or 6–3 or 6) Gates
Laboratory fee each semester: $15 for 3 semester hours; $30 for 6 semester hours. (Academic year)

*281 **Sculpture V** (3 or 6) Gates
Laboratory fee: $15 for 3 semester hours; $30 for 6 semester hours. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Art Therapy—Graduate Study

Professor B.I. Levy *(Program Director)*
Adjunct Assistant Professors Hanna Kwiatkowska, Elinor Ulman *(Coordinator of Training)*
Assistant Professorial Lecturers Edith Kramer, Mildred Lachman
Clinical Instructors Silas Parrish, Georgette Powell, J.B. Ramsay, Christine Wang

Master of Arts in the field of Art Therapy.—Prerequisite: a Bachelor's degree, evidence of significant training and/or experience in the arts, including painting, drawing, and ceramic sculpture; course work in the behavioral and/or social sciences, including personality theory, abnormal psychology, and child psychology.
Required: the general requirements, pages 92–97. Prospective candidates should consult Professor Levy for specific requirements.
Fields of Emphasis: Adult Art Therapy, Family Art Therapy, Child Art Therapy, and Research.

THIRD GROUP

201 **Introduction to Art Therapy** (3) Ulman
Lectures, presentation of illustrative case material, class discussion of assigned readings. Survey covering range of art therapy practice, historical development, main theoretical trends. (Fall)

202 **Case Studies in Art Theory** (3) Ulman
Discussion of case material provided by students in order to refine methods of working, improve written and oral reports. Instructor and other practitioners may provide supplementary illustrative material. Assigned reading. (Spring)

203 **Techniques of Art Therapy** (3) Kwiatkowska
Studio work: useful art therapy approaches to drawing, painting, and

* Fine Arts majors and Master of Fine Arts candidates should elect 6 semester hours of credit.

ceramic sculpture. Discussion among students of their expressive products. Presentation of case material showing patients' use of the techniques studied. (Fall)

205–6 **Family Art Techniques** (3–3) Kwiatkowska

Principles of family art therapy as adjunctive and primary treatment; art techniques for evaluation of family dynamics. During the spring semester students participate in working with families. (Academic year)

207–8 **Art as Therapy with Children** (3–3) Kramer

Lecture, presentation of case material, studio work, class discussion of assigned reading. Special considerations of work in art therapy with children explored from the theoretical and practical standpoints. (Academic year)

211 **Survey of Art Therapy** (3) Lachman, Ulman

Lecture, reading, discussion, studio work. Use of visual arts in the service of personal development: history, theories, range of practice. Not open to candidates for the degree of Master of Arts in the field of Art Therapy. Open to advanced undergraduates with permission of instructor. (Fall and spring)

275 **Group Art Therapy** (3) Kwiatkowska, Ulman

Development of skills and increased awareness as a participant in an art therapy group. Limited to selected Master's degree candidates. Prerequisite: a minimum of 6 semester hours of graduate course work in Art Therapy and permission of instructor.

283 **Practicum in Art Therapy** (3) Staff

Field experience. On-the-job supervision supplemented by supervision from the University art therapy staff. May be repeated for credit with approval of adviser.

285 **Special Projects in Art Therapy** (3) Staff

Individual study based on practicum; details to be worked out with each student. Resource people may be called upon to assist, as appropriate. May be repeated for credit with approval of adviser.

Astronomy

See "Physics."

Biochemistry

Professors C.R. Treadwell (*Chairman*), B.W. Smith, G.V. Vahouny, J.M. Bailey, Helen Hess

Professorial Lecturers W.W. Burr, Jr. (*Isotopes*), Edward Steers, Jr., W.F. Anderson (*Genetics*), Gordon Guroff, A.N. Schechter, G.F. Combs, Steven Levisohn

Assistant Professors G.A. Walker, Linda Gallo (*Research*)

Lecturer P.H. Fishman
Special Lecturer J.C. Smith, Jr.

Master of Science in the field of Biochemistry.—Prerequisite: a Bachelor's degree. The undergraduate program must have included the following courses, or equivalent: B Sc 11–12; Chem 11–12, 22, 151–52, 153–54; Phys 1, 2.

Required: the general requirements, pages 92–97, including Bioc 221–22, 227, 299–300. The remaining courses are to be selected from Bioc 224, 232, 241, 262, 295; or, with the approval of the adviser, from graduate courses in Chemistry, Microbiology, Physiology, or Pharmacology. It is usually not possible to arrange courses and research so that the student can be assured of completing all of the required work in one academic year.

Master of Science in the field of Mycology.—An interdepartmental degree offered by the departments of Biochemistry, Epidemiology and Environmental Health, and Microbiology. See the Department of Epidemiology and Environmental Health, which administers the program, for details.

Doctor of Philosophy in the field of Biochemistry.—Required: the general requirements, pages 92–96, 99–101.

Research fields: Amino Acid Metabolism; Animal Nutrition; Biochemical Evolution; Biochemistry of Cancer; Biochemistry of Tissue Culture; Carbohydrate Metabolism; Chemistry and Metabolism of Carbohydrates, Lipids, Proteins; Complex Lipids; Endocrinology; Intermediary Metabolism; Lipids; Metabolic Relationships of Insulin; Metabolism; Metabolism of Connective Tissue; Metabolism of Purines and Pyrimidines; Neurochemistry; Nutrition; Protein Biosynthesis; Protein Metabolism; Tissue Respiration; and Vitamins.

221–22 **General Biochemistry** (4–5) Vahouny

Lectures and laboratory. Prerequisite: Chem 152, 154. Material fee, $20 a semester. (Academic year)

224 **Biochemistry of Enzymes** (1)

Biochemistry of enzymes and enzyme reactions. Prerequisite: Bioc 221. (Fall)

225 **Biochemistry Procedures** (3) B. Smith and Staff

Laboratory course. Material fee, $16. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

227 **Biochemistry Seminar** (1) Staff

Current literature in biochemistry. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

232 **Proteins and Amino Acids I** (1) Steers

Prerequisite: Bioc 221. (Fall)

233 **Proteins and Amino Acids II** (1) Steers, Schechter

Continuation of Bioc 232. Methods for the study of protein confirmation; determination of active sites of enzymes; mechanisms of reactions at the active site. (Spring)

241 **Isotopes** (3) Burr

Theoretical characterization of isotopes and their applications in biology and medicine. Attention given to counting, health physics and radiation safety, autoradiography, chromatography. Laboratory fee, $16. (Spring)

251 **Carbohydrate Metabolism** (1) Staff

Prerequisite: Bioc 222. (Spring 1974 and alternate springs)

252 **Biochemistry of the Brain** (1) Staff

For medical students; open to limited number of graduate students. Re
cent biochemical developments in structure, functions, and metabolic
processes unique to the brain. (Spring)

254 **Human Nutrition** (1) Combs

For medical students; open to limited number of graduate students. Ap
plication of nutritional principles in humans. (Spring)

256 **Biochemistry of Organ Function** (1) N. Kramer*

For medical students; open to limited number of graduate students. Em
phasis on biochemical processes unique to particular organ systems; ap
plication of these processes to evaluation of function. (Spring)

258 **Inherited Metabolic Diseases** (1) Levisohn

For medical students; open to limited number of graduate students. Con
tribution of molecular biology to understanding of human mutations and
hereditary diseases. Specific disease states and genetics of protein struc
ture discussed. Prerequisite: Bioc 222. (Spring)

260 **Biochemistry of the Steriods** (1) O. Dodek†

For medical students; open to limited number of graduate students. Basic
chemistry of the steroids, pathways of biosynthesis and metabolism,
regulatory mechanisms, physiologic effects, clinical measurement of endog
enous steroids, clinical manifestations of steroid imbalance, steroid
changes in pregnancy, and steroid therapy. (Spring)

262 **Biochemistry of the Lipids** (1) Vahouny

1973–74 and alternate years: chemistry, properties, occurrence of importan
classes of biological lipids. 1974–75 and alternate years: metabolism of
lipids, including digestion, energy production, biosynthesis, function in
specialized tissues and subcellular structures. Content differs each time
course is offered; may be repeated for credit. (Spring)

266 **Biochemical Genetics** (1) Anderson

For medical students; open to limited number of graduate students.
(Spring)

268 **Biochemistry of Bone and Muscle** (1) Walker

Study of structure, chemistry, and biochemistry as they relate to the nor
mal and diseased states of bone and muscle; emphasis on current theories
and techniques. (Spring)

295 **Research in Biochemistry** (arr.) Staff

Participation in a project under investigation in the Department or one in
a related field suggested by the student and approved by the Staff. Con
tent differs each time course is offered; may be repeated for credit.
(Fall and spring)

* Dr. Kramer is Associate Professor of Medicine in the School of Medicine.
† Dr. Dodek is Assistant Clinical Professor of Obstetrics and Gynecology in the School of Medicine

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Biological Sciences

Professors A.H. Desmond *(Chairman)*, R.L. Weintraub, Kittie Parker
Adjunct Professors T.E. Bowman, M.L. Jones, L.S. Kornicker, H.A. Rehder, F.A. Chace, Jr., Raymond Manning
Professorial Lecturers K.C. Kates, R.S. Sigafoos, W.A. Shropshire, Jr.
Associate Professor S.O. Schiff
Adjunct Associate Professors W.D. Hope, D.L. Pawson, Joseph Rosewater, C.F. Roper, C.G. McWright, Mary Rice
Assistant Professors W.G. Nash, D.L. Atkins, Henry Merchant, R.K. Packer, T.L. Hufford, R.E. Knowlton
Adjunct Assistant Professor P.E. Spiegler
Assistant Professorial Lecturers Jessie Dickens, Isabel Griffith, Barbara Timberlake
Lecturer Dee Ann Houston

Bachelor of Arts or *Bachelor of Science with a major in Biology, Botany,* or *Zoology (Departmental).*—The following requirements must be fulfilled:
1. The general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Social Studies and the Humanities.)
2. Prerequisite courses—B Sc 11–12, or equivalent.
3. Required courses in related areas—Chem 11–12; Chem 151–52 and 153–54, or 50. (The following courses are strongly recommended: Math 31; Phys 1, 2; two years of French, German, or Russian; Stat 91.)
4. (a) Required courses for the major in Biology—a minimum of 24 semester hours of second-group courses, which should include at least 6 hours in Biology, 6 in Botany, and 6 in Zoology.
(b) Required courses for the major in Botany—a minimum of 24 semester hours of second-group courses in Botany or a combination of Botany and Biology.
(c) Required courses for the major in Zoology—a minimum of 24 semester hours of second-group courses in Zoology or Biology.

Master of Science in the field of Biology, Botany, or *Zoology.*—Prerequisite: a Bachelor's degree with a major in one of the following from this University, or an equivalent degree: (1) *Biology field*—an undergraduate major in Biology, Botany, or Zoology; (2) *Botany field*—an undergraduate major in Botany or Biology; (3) *Zoology field*—an undergraduate major in Zoology or Biology. The undergraduate program must have included the following courses, or equivalent: Chem 151–52 and 153–54, or 50; Math 31; Phys 1, 2.

Required: the general requirements, pages 92–97. The minimum requirement consists of 24 semester hours of approved course work plus a thesis (equivalent to semester hours). With the permission of the Department a student may elect a program of study consisting of 36 semester hours of approved course work without a thesis.

Doctor of Philosophy in the field of Biology, Botany, or *Zoology.*—Required: the general requirements, pages 92–96, 99–101. The program of study is determined in consultation with the graduate committee of the Department. Each candidate is required to pass the General Examination in four areas which support the field of study selected. The required courses and tool subject options vary with the field of study undertaken.

Research fields in Biology: Cell Physiology, Cytogenetics, Cytology, Developmental Genetics, and Molecular Genetics.

Research fields in Botany: Photobiology, Phycology, Plant Ecology, Plant Physiology (Microorganisms), Plant Physiology (Vascular Plants), and Taxonomy.

Research fields in Zoology: Animal Ecology; Bioenergetics; Comparative Neuroanatomy; Comparative Physiology; Herpetology; Histophysiology; Invertebrate Zoology; Marine Biology; Radiation Biology; Taxonomy, Anatomy, and Physiology of Mollusks; Vertebrate Anatomy and Taxonomy; Vertebrate Embryology and Morphogenesis; Vertebrate Ichthyology; and Vertebrate Physiology.

Bachelor of Arts in Education with a teaching field in Biology.—Prerequisite: the Education curriculum, page 78.

Required: the Biology option and the professional courses listed on pages 110, 118

Departmental prerequisite: B Sc 11–12 or equivalent is prerequisite to all second-group courses in Biology, Botany, and Zoology, except by permission of the instructor.

BIOLOGY

FIRST GROUP

3–4 **Introductory Biology for Nonscience Majors** (3–3) Schi

Lecture (2 hours), laboratory (2 hours). Survey of biological principles, emphasis on man as a functional organism in his environment. Prerequisite to B Sc 4: B Sc 3. Material fee, $12 a semester. (Academic year)

11–12 **Introductory Biology for Science Majors** (4–4) Merchant

Lecture (3 hours), laboratory (3 hours). Biological principles and problems designed to furnish a base for advanced studies in biology and related sciences. Prerequisite to B Sc 12: B Sc 11. Material fee, $15 a semester. (Academic year)

*26 **Environmental Issues** (3) Pederson, Schi

An interdisciplinary analysis of selected aspects of the population question, pollution and human health, urban environmental problems, issues of economic growth and development, technology and public policy. (Spring)

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* Offered jointly by the Division of Experimental Programs and the departments of Biological Science and Geography and Regional Science.

SECOND GROUP

108 **Organic Evolution** (3) Staff

Theories of organic evolution and present ideas on principal lines of development in the plant and animal kingdoms; review of mechanisms involved in the process. (Fall and spring)

111 **Introductory Microbiology** (4) Weintraub

Lecture (2 hours), laboratory (4 hours). Survey of the major groups of microorganisms with emphasis on structure, physiology, ecology, phylogenetic relationships, and economic importance. Prerequisite: one year of chemistry. Material fee, $15. (Fall)

115 **Cytology** (4) Schiff

Lecture (2 hours), laboratory (4 hours). Structure and function of cells; analysis of chromosomes; cytological techniques and preparation of slides. Recommended: one year of chemistry.

118 **Advanced Cytology** (3) Schiff

Lecture (1 hour), laboratory (4 hours). Mechanisms of cell action. Laboratory consists of a project to be selected by the student with concurrence of the instructor. Prerequisite: B Sc 115. Material fee, $15.

122 **Molecular and Subcellular Biology** (3) Weintraub
(*Formerly Cell and Molecular Biology*)

Structure and function of biological molecules, viruses, and cellular organelles. Prerequisite: one semester of organic chemistry. (Fall)

123 **Cell Biochemistry** (3) Weintraub

Introduction to the metabolism of generalized cells of animals, plants, and microorganisms, including energetics, enzymes, respiration, biosyntheses, and regulatory mechanisms. Prerequisite: one semester of organic chemistry. (Spring 1974 and alternate springs)

124 **Cell Biochemistry Laboratory** (1) Weintraub

Designed to illustrate some of the principles and techniques of biochemical experimentation. Prerequisite or concurrent registration: B Sc 123. Material fee, $18. (Spring 1974 and alternate springs)

127 **Genetics** (4) Nash

Lecture (3 hours), laboratory (2 hours). Introductory course. Basic aspects of transmission of genetic traits with particular reference to the chemical basis of heredity and gene action. Material fee, $15. (Fall and spring)

129 **Cell Physiology** (3) Weintraub

Study of cell processes, including growth, division, differentiation, interactions, aging, movements, energy perception and transduction, luminescence. (Spring 1975 and alternate springs)

130 **Cell Physiology Laboratory** (1) Weintraub

Exercises to illustrate some principles and techniques. Prerequisite or concurrent registration: B Sc 129. Material fee, $18. (Spring 1975 and alternate springs)

138 **Advanced Genetics** (3)

Emphasis on the use of genetic analysis in solving modern biological pr
lems. Prerequisite: introductory course in genetics. (Spring)

167 **Radiation Biology** (3)

Chemical, physical, and biological aspects of radiation; effects of radiati
on cells and organisms, with emphasis on mammals; genetic effe
Recommended: two years of biological sciences, and chemistry or physi
(Fall)

171 **Undergraduate Research** (arr.)

Admission by permission of the staff member concerned. May be r
peated for credit. Prerequisite: Chem 50 or 152; 16 semester hours
Biological Sciences courses. Material fee, $15. (Fall and spring)

172 **Independent Study in Cell and Molecular Biology** (2)

Prescribed reading list and consultations with staff adviser culminating
a written report and/or examination. (Fall)

173 **Independent Study in Developmental Biology** (2)

Prescribed reading list and consultations with staff adviser culminating
a written report and/or examination. (Fall)

174 **Independent Study in Organismic Biology** (2)

Prescribed reading list and consultations with staff adviser culminating
a written report and/or examination. (Fall)

175 **Independent Study in Genetic and Evolutionary Biology** (2)

Prescribed reading list and consultations with staff adviser culminating
a written report and/or examination. (Fall)

176 **Independent Study in Environmental Biology** (2)

Prescribed reading list and consultations with staff adviser culminating
in a written report and/or examination.

177 **Laboratory Techniques, Instrumentation, and Data Analysis** (3)

Theory and practice in experimental design; techniques and instrumen
tation used in biological research laboratories.

181–82 **Senior Seminar** (1–1)

Lectures and discussions on current biological problems. (Academ
year)

THIRD GROUP

206 **Seminar: Radiation Biology** (3)

Actions of radiation at subcellular, cellular, and organismal levels; factor
modifying radiation damage; practical considerations in radiation exposure
Prerequisite: B Sc 167 or equivalent. (Spring)

207 **Seminar: Origin of Life** (3)

(Spring 1974 and alternate springs)

220 **Seminar: Cell Physiology** (3) Shropshire
Review in depth of selected topics. May be repeated for credit. (Fall 1974 and alternate falls)

222 **Seminar: Topics in Molecular Biology** (3) Weintraub
(Spring 1975 and alternate springs)

227 **Seminar: Genetics** (3) Nash
(Fall)

255 **Seminar: Consortium Biology** (2)
Topic to be announced in *Schedule of Classes*. (Spring)

295 **Research** (arr.) Staff
Investigation of special problems. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Rsearch** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

BOTANY

SECOND GROUP

105 **Local Flora** (4) Parker
Lecture (2 hours), laboratory and field (4 hours). Field and laboratory studies on local flora; emphasis on the woody plants. Material fee, $12. (Fall)

106 **Field Botany—Lower Plants** (4) Parker
Lecture (2 hours), laboratory and field (4 hours). Primarily for non-specialists, emphasizing algae, mosses, and ferns. Material fee, $12. (Spring)

109 **Structure of Seed Plants** (4) Hufford
Lecture (2 hours), laboratory (4 hours). Morphology, anatomy, and histology of seed plants. Material fee, $12. (Fall)

110 **Lower Plants** (4) Hufford
Lecture (2 hours), laboratory (4 hours). Structure, life cycle, phylogeny, ecology, and economic importance of algae, fungi, mosses, and ferns. Material fee, $12. (Spring)

125 **Flowering Plants** (4)

Lecture (2 hours), laboratory and field (4 hours). Origin, evolution development, and principles of systematics of flowering plants. Mate fee, $12. (Spring)

132 **Mycology** (4)

Lecture (2 hours), laboratory (3 hours). Material fee, $12. (Fall)

134 **Plant Pathology** (4)

Lecture (2 hours), laboratory (3 hours). Material fee, $12.

135 **Plant Physiology** (4)

Lecture (2 hours), laboratory (4 hours). Physiology of seed plants w emphasis on growth, development, tropisms, and reproduction. Prereq site: Chem 11–12. Recommended: Chem 50 or 151–52. Material fe $18. (Spring 1975 and alternate springs)

141 **Plant Ecology** (4)

Lecture (2 hours), laboratory (4 hours). Material fee, $12. 1974 and alternate falls)

THIRD GROUP

221 **Seminar: Systematics** (3)

Review of current work in various disciplines of systematic research; topi of special interest to participants. (Fall 1973 and alternate falls)

235 **Seminar: Plant Physiology** (3)

242 **Seminar: Plant Ecology** (3)

(Spring 1974 and alternate springs)

299–300 **Thesis Research** (3–3)

(Fall and spring)

ZOOLOGY

SECOND GROUP

101 **Invertebrate Zoology** (4)

Lecture (2 hours), laboratory (4 hours). General survey of invertebrat animals, including classification, morphology, physiology, embryology, an evolutionary relationships among phyla. Material fee, $18. (Fall)

102 **Advanced Invertebrate Zoology** (4)

Lecture (2 hours), laboratory and field (4 hours). Study of invertebrat systems (cells, tissues, organs, organisms), with emphasis on function aspects (physiology and ecology) and taxonomy of important group Prerequisite: B Sc 101 or equivalent. Material fee, $18. (Spring)

104 **Comparative Vertrebrate Anatomy** (4)

Lecture (2 hours), laboratory (4 hours). Evolution and comparativ morphology of vertebrates, stressing recent forms. Material fee, $18. (Fall and spring)

140 **General Ecology** (4) Merchant

Lecture (3 hours), laboratory and field (3 hours). Introduction to the concepts of limiting factors, biogeochemical cycles, trophic levels, and energy transfer, and their relationship to the structure and function of populations, species, communities, and ecosystems. Material fee, $15. (Fall)

143 **Animal Ecology** (4) Merchant

Lecture (3 hours), laboratory and field (3 hours). Application of ecological principles to the understanding and manipulation of animal populations. Prerequisite: B Sc 140 or permission of instructor. Laboratory fee, $15. (Spring)

144 **Aquatic Ecology** (4) Staff

Lecture (3 hours), laboratory and field (3 hours). Principles applied to aquatic systems with special references to physicochemical properties, typical habitats and communities. Prerequisite: B Sc 143 or permission of instructor. Laboratory fee, $15. (Spring)

145 **Introduction to Vertebrate Embryology** (4) Staff

Lecture (2 hours), laboratory (4 hours). Origin and early development of the individual, formation of organ systems. Emphasis on frog, chick, and pig, with reference to human embryo. Material fee, $15. (Fall and spring)

148 **Histology** (4) Desmond

Lecture (2 hours), laboratory (4 hours). Introduction to microscopical anatomy of normal tissues and organs with emphasis on the interrelationship of structure and function. Material fee, $15. (Fall and spring)

152 **Protozoa** (4) Staff

Lecture (2 hours), laboratory (4 hours). Introduction to protozoa: classification, life histories, genetics, and physiology; emphasis on free-living types. Material fee, $15. (Spring 1974 and alternate springs)

154 **Vertebrate Zoology** (4) Atkins

Lecture and discussion (2 hours), laboratory and field (4 hours). Vertebrate natural history and systematics, emphasizing higher and transitional taxa. Prerequisite: B Sc 104. Material fee, $15. (Spring)

155 **Parasitology** (4) Kates

Lecture (2 hours), laboratory (4 hours). Introduction to animal parasitology; survey of parasitic types from protozoa through arthropods. Material fee, $15. (Fall 1974 and alternate falls)

157 **Comparative Endocrinology** (3) Desmond

Comparative study of basic principles of chemical integration, neuroendocrine relationships, and mechanisms of hormone action. (Spring)

161 **Entomology** (4) Staff

Lecture (2 hours), laboratory (4 hours). Elementary morphology, physiology, and ecology of insects; introduction to taxonomy of more important groups. Material fee, $15. (Fall)

162 **Insect Physiology** (4)

Lecture (2 hours), laboratory (4 hours). Introduction to the structu and functional relationships in insects. Prerequisite: B Sc 161. Materi fee, $15. (Spring)

163 **Human Physiology** (3)

(*This course, together with B Sc 164, replaces former B Sc 163 (4)*)

Introduction to the function of organ systems of the human body. (Fall)

164 **Human Physiology Laboratory** (1)

(*This course, together with B Sc 163, replaces former B Sc 163 (4)*)

Study of basic physiology laboratory techniques; emphasis on the exper mental study of homeostatic mechanisms in humans. Prerequisite concurrent registration: B Sc 163. Material fee, $18. (Fall)

165 **Vertebrate Physiology** (4)

(*Formerly B Sc 164*)

Lecture (3 hours), laboratory (3 hours). Detailed study of selected orga systems, stressing chemical and physical bases. Prerequisite: B Sc 16 and 164, or equivalent. Prerequisite or concurrent registration: Chem 151–52 or 50. Material fee, $18. (Spring)

THIRD GROUP

204 **Seminar: Invertebrate Zoology** (3)

Study of original publications on hormones of invertebrate animals. (Fall)

*205 **Comparative Pathology** (3)

An introduction to the study of disease and disease mechanisms in verte brates, and comparison with disease in man. Recommended: courses in anatomy, histology, and physiology. (Fall)

244 **Histophysiology** (3)

(*Formerly B Sc 251 Seminar: Vertebrate Zoology*)

Study of current publications in the field of histophysiology.

245 **Histochemistry** (3)

Theory and application of chemical techniques in determining changes in the amount and distribution of inorganic and organic constituents of tis sues during different physiological and pathological conditions.

247 **Morphogenesis** (3)

Lectures and reports on experimental morphology. Emphasis on early embryonic development. Prerequisite: B Sc 145 or equivalent. (Spring 1974 and alternate springs)

250 **Seminar: Regeneration** (3)

Discussions and reports on theories and experimental evidence in both vertebrate and invertebrate animals. (Spring 1975 and alternate springs)

* An interdepartmental course offered by the departments of Biological Sciences and Pathology.

252 **Seminar: Neurobiology** (3) Atkins
Study of current publications in the field of neurobiology. (Spring 1975 and alternate springs)

265 **Comparative Animal Physiology** (3) Packer
Survey of the physiological basis of adaptation of animals to diverse environments, emphasis on nonmammalian vertebrates. Prerequisite: B Sc 164 or equivalent. (Fall)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Biology

See "Biological Sciences."

Botany

See "Biological Sciences."

Business Administration

Professors J.L. Jessup, J.C. Dockeray, R.B. Eastin, Edwin Timbers, H.R. Page (*Chairman*), Frederick Amling, Guy Black, P.D. Grub
Professorial Lecturers L.C. Collins, R.A. Kaye, K.F. McClure, J.P. Murphy, J.F. Doubleday, W.G. Torpey, Ben Burdetsky
Associate Professors E.R. Magruder, Rodney Eldridge, R.A. Barrett, G.P. Lauter, S.F. Divita, J.R. Roman, Jr., S.N. Sherman, Norma Loeser, P.L. Foster
Associate Professorial Lecturers R.W. Hagauer, Bruce Benefield, J.H.H. Carrington, T.C. Stanton, M.J. Johnson, Martin Wender
Assistant Professors J.W. Waldrip, R.F. Dyer, V.T. Velasco
Assistant Professorial Lecturers G.J. Glassman, N.R. Harbaugh, L.R. Brown, J.G. Birdsong, J.R. Potter, Jr., Stanley Tesko, P.A. Schulkin
Instructor R.A. Oliver

Programs of study in Business Administration leading to the degrees of *Bachelor of Business Administration, Master of Business Administration,* and *Doctor of Business Administration* are offered by the School of Government and Business Administration (see pages 131–61).

FIRST GROUP

51 **Introduction to Business** (3) Page
Structure, activities, and problems of business enterprise; its contribution to the individual and to society; careers in business. (Fall and spring)

61 **Personal Finance** (3)

Management of personal and family income and expenses; consum spending, budgeting, home buying, credit buying, borrowing, bankin saving and investing, insurance and estate planning, taxation. (Fal

SECOND GROUP

101 **The Business Environment** (3) Timbe

Economic and legal environment of business enterprise; social and polit cal influences; contemporary problems and issues. (Fall and spring)

102 **Fundamentals of Management** (3)

Planning, organizing, directing, coordinating, and controlling activities o the administrative unit; evolution of management thinking. (Fall an spring)

104 **Small Business Management** (3)

Essentials of operating a small business; required records and report resolution of day-to-day problems, sources of assistance to small busi nesses. Offered primarily as a service to the business community; open to degree candidates with the approval of the instructor. (Spring)

105 **Personnel Management** (3) Barrett, Loese

The labor force and labor markets. Industrial personnel and manpower programs, organization and policy in personnel activities. (Fall an spring)

106 **Problems in Personnel Management** (3) Loeser, Magruder

Principles and problems of personnel management and industrial relations illustrated by cases drawn from industry and government. Prerequisite: B Ad 105. (Fall)

107 **Collective Bargaining** (3) Barrett

American unionism and collective bargaining; economic, social, and public policy considerations. The negotiation and administration of collective bargaining agreements. Prerequisite: B Ad 105 or permission of instructor. (Spring)

113 **Real Estate** (3) Doubleday

Principles of urban real estate practice; leasing and property manage ment, valuation, appraisal, financing, taxation, urban growth, urban re newal. (Fall)

121 **Fundamentals of Insurance** (3) Doubleday

Function of insurance in the economic life of business and individuals risk planning, conservation, management. (Fall)

122 **Insurance Estate Planning** (3) Doubleday

Estate programming, role of insurance in providing protection and estate development, disposition of the individual estate. Prerequisite: B Ad 121 (Spring)

131 **Business Finance** (3) Amling, Foster, J. Roman

Analyzing capital requirements and methods of acquiring funds; planning efficient use of capital. Asset management, financial analysis, sources o

funds, capital budgeting, stockholder relationships. Prerequisite: Acct 1–2; Econ 1; Math 30, 31; Stat 51. (Fall and spring)

132 **International Business Finance** (3) Eldridge

Principles, practices, problems, and institutions of international finance. Emphasis on international financial markets, exchange rates, balance-of-payments restraints, and governmental policies. Prerequisite: B Ad 131. (Fall)

133 **Capital Formation** (3) Eldridge, Schulkin

The process of capital formation in a free enterprise economy. Roles of business firms, financial intermediaries, money and capital market institutions, governmental regulatory agencies, fiscal and monetary policies. Prerequisite: B Ad 131. (Spring)

138 **Investment and Portfolio Management** (3) Amling, Foster

Theory and principles of security analysis and portfolio management, including analysis of the national economy, industry, company, and security markets. Risk-reward and computer-aided analysis. Prerequisite: Acct 1–2, B Ad 131. (Fall and spring)

141 **Basic Marketing Management** (3) Divita, Dyer

Marketing and marketing management, consumer and demand analysis, retailing, wholesaling. Emphasis on major decision areas and tools. Prerequisite: B Ad 102, Econ 1–2. (Fall and spring)

143 **Marketing Research** (3) Divita, Dyer

Principles and practices of marketing research; emphasis on basic methods and techniques, sources and interpretation of data, and presentation of results. Prerequisite: B Ad 141. (Spring)

144 **International Marketing Management** (3) Lauter

Analysis of the international marketing position of the United States, channels for international marketing, international advertising media, legal aspects, foreign market surveys, development of policies. (Fall)

145 **Sales Management** (3) Waldrip

Organization of sales department, sales planning and forecasting, quotas, territories, performance standards, and analysis and control of distribution costs. Prerequisite: B Ad 141. (Fall)

147 **Advertising** (3) Dyer

Advertising as a function of marketing and merchandising; uses and limitations, evaluation, criticism, and control of advertising. (Spring)

158 **Physical Distribution Management** (3) Potter

Distribution from shipper's point of view: problems of plant location, inventory control, warehousing; traffic management emphasized, including private carriage. Prerequisite: Econ 1–2. (Fall)

161 **Commercial Law: Contracts, Sales, Agency, Bailments** (3) Collins, McClure, Murphy

(Fall and spring)

162 **Commercial Law: Negotiable Instruments, Property, Mortgages** (3) Collins, McClure, Murphy

(Spring)

171 **Principles of Transportation** (3) J. Roma

Impact of intercity transportation systems on society. Emphasis on mode differences in development, economic characteristics, and regulation. Pre requisite: Econ 1–2. (Fall)

172 **Public Utilities** (3)

Legal and economic meaning of public utility concept; development, ser ices, economic characteristics, rate-making, and regulation with emphasi on electric, gas, and telephone industries. Prerequisite: Econ 1–2. (Spring)

173 **Transportation Systems Management** (3) J. Roma

Comparative study, from the standpoint of various carrier modes, of ma agement problems common to all modes of domestic and internationa transportation. Prerequisite: B Ad 171, Econ 1–2. (Spring)

174 **Urban Transportation** (3) J. Roma

Problems of developing balanced transportation systems for urban areas– area needs, modal evaluation, cost effectiveness, finance, and marketing Prerequisite: B Ad 171, Econ 1–2; or equivalent. (Fall)

175 **Introduction to Foreign Trade** (3) Kaye, Waldrip, Velasc

Physical movement of goods in international business; conditions es sential for successful trading; export shipment, documentation, procedura problems. Emphasis on ocean marine insurance and export traffic manage ment policy. Prerequisite: Econ 1–2. (Fall and spring)

176 **International Business Theory and Policy** (3) Eldridge

Relationships underlying international business transactions, role of govern ment, international agreements between private producers, trade wit developing nations, policy. Prerequisite: Econ 1–2. (Fall and spring

178 **International Business Policy and Operations** (3) Waldrip

(*Formerly Management of International Business Operations*)

Analysis of overseas projects according to purpose and type of organiza tion; development and management of overseas operations in differen world areas. Prerequisite: B Ad 175 or permission of instructor. (Spring)

181 **Manufacturing Production** (3) Page, Olive

Basic principles and methods of manufacturing production. Manufactur ing facilities, plant and equipment. Illustrations selected from various process and fabrication industries. (Fall and spring)

198 **Business Policy and Administration** (3) Eastin, Stanto

(*Formerly Case Problems in Management*)

Terminal undergraduate course in Business Administration. Integratio of functional activities in arriving at over-all business policy decisions Prerequisite: B Ad 102, 105, 131, 141, 181.

199 **Individual Research** (3)

Assigned topics. Admission by permission of adviser. May be repeate once for credit. (Fall and spring)

THIRD GROUP

201 **Social Environment of Business** (3) Timbers, Divita

Contemporary social forces acting on business management; business responsibility, ethics. (Fall)

202 **Relations of Government to Business** (3) Timbers

Regulatory and promotional activities of the government, independent regulatory agencies, antitrust activities, monetary and fiscal policy, regulation of labor-management relations. (Spring)

203 **Legal Environment of Business** (3) Timbers

Business under the U.S. Constitution, federal legislation, legal precedents, and agency orders. Major emphasis on court decisions relating to business. Prerequisite: B Ad 202 or permission of instructor. (Spring)

208 **Personnel Management and Industrial Relations** (3) Barrett, Magruder

Survey of personnel management practices and procedures, including labor-management relations. (Fall)

209 **Seminar: Personnel Management** (3) Eastin

Industrial personnel and manpower management, research in advanced problems. (Spring)

210 **The Personnel Manager** (3) Jessup

The personnel manager and his place in the organization, relation to other executives, policy role and relations with chief executive. Problems of the senior personnel executive. Prerequisite: B Ad 208 or permission of instructor.

211 **Leadership and Executive Development** (3) Grub, Loeser

Theories of managerial leadership; issues and problems associated with leadership in large organizations and at higher management levels; executive selection and development. Prerequisite: Mgt 201 or permission of instructor. (Fall and spring)

212 **Unionism and Collective Bargaining** (3) Barrett, Burdetsky

The American labor movement. Collective bargaining and the conduct of labor relations under collective bargaining agreements. (Fall)

213 **Current Issues in Unionism, Collective Bargaining, and Labor Relations** (3) Barrett, Burdetsky

Current problems and issues. Prerequisite: B Ad 212. (Spring)

*215 **Seminar: European Common Market** (3) (Same as Law 541 (2))

*217 **Seminar: International Technical and Economic Assistance** (3) (Same as Law 542 (2))

*218 **Legal Aspects of International Business Transactions** (3) (Same as Law 427 (2))

225 **Seminar: Manufacturing Production** (3) Oliver

Production technology, including new processes, materials, products, equip-

* Students registering for B Ad 215, 217, or 218 make special arrangements with the instructor for supplementary assignments equivalent to one additional semester hour. For description of the courses, see the *National Law Center* catalogue.

ment, and facilities. Implications of emerging technology in managing the production function. Prerequisite: B Ad 181 or permission of instructor. (Spring)

231 **Financial Decision-making** (3) Amling, Dockeray

Functions and objectives of financial management, asset management, problems of internal financial analysis, rate-of-return analysis, financial forecasting, problems of capital demand and supply. Prerequisite: Acct 115 or equivalent, B Ad 131. (Fall and spring)

232 **Capital Resource Management** (3) Amling, Schulkin, Dockeray

Problems of capital acquisition, costs, rationing, structure; dividend policy. Prerequisite: B Ad 231. (Fall)

233 **International Business Finance** (3) Eldridge

Analysis of problems in international business finance. Impact of the evolving international payments system on business. Prerequisite: B Ad 131 or equivalent. (Spring)

234 **Seminar: Capital Formation** (3) Eldridge

Determinants of saving and investment, timing of corporate security issues, analysis of current capital market conditions. Prerequisite: B Ad 131 or equivalent. (Fall)

235 **Financial Management** (3) Amling

Problems of financial management; planning financial structure, obtaining and managing capital, issuing and placing securities, administering income, security arrangements. Prerequisite: Acct 215, Mgt 201. (As arranged)

237 **Investment Analysis** (3) Amling

Risk-reward analysis of security investments including analysis of national economy, industry, company, and market; introduction to portfolio management; emphasis on theory and computer methods. Prerequisite: B Ad 131. (Fall and spring)

238 **Seminar: Investment and Portfolio Management** (3) Amling

Portfolio management theory, application, and computer modeling. Independent research on investment analysis and portfolio management with emphasis on theory, cases, and computer applications. Prerequisite: B Ad 237.

241 **Marketing Management** (3) Lauter, Divita

Marketing management problems; market segmentation, product planning, channels of distribution, advertising, personal selling, sales promotion, pricing and development of integrated marketing programs. (Fall and spring)

243 **Seminar: Marketing Research** (3) Dyer

Research as an aid to decision-making and increased efficiency in marketing, marketing research process, critical appraisal of methods and results, applications. (Spring)

246 **Consumer Behavior** (3)

Consumer decision-making in the market place; research in pertinent interdisciplinary studies in psychology, sociology, and other behavioral fields; present and potential applications for marketing. (Fall)

247 **Current Issues in Marketing** (3) Divita

Primarily for doctoral students. Theoretical and practical issues in the development of a comprehensive and interrelated body of knowledge in marketing. Impact of current political, economic, and social trends. (Fall)

248 **International Marketing** (3) Lauter

Organization for international marketing, demand analysis, product development and policies, marketing structure and trade channels, advertising and promotion problems and policies, pricing, and legal aspects. Effective international marketing strategy. (Fall and spring)

249 **Marketing Policy** (3)

Analysis of complex marketing problems involving policy and operational decisions; emphasis on creative marketing strategy. (Spring)

250 **Marketing to the Government** (3) Divita

Overview of government R&D and systems markets. Government acquisition process, buyer behavior, market research, technological planning and the bid decision, field sales force management, proposals, market strategy, pricing strategy, product-line strategy. (Fall)

253 **Distribution Logistics** (3) Potter

Problems of physical distribution and supply of goods. Role of logistics in the economy and the business firm, transportation rates and services, location theory and problems, service standards, inventory control, information flow, scheduling, allocation, warehousing, traffic, and logistics system organization. (Spring)

254 **International Research and Development** (3)

Technological, political, social, and economic factors affecting international R&D policy; problems in industrial, governmental, and international organizations; world technological forecasting; resource allocation; technology transfer. Prerequisite: Mgt 230 or permission of instructor.

255 **International Business in Perspective** (3) Grub, Eldridge

(*Formerly International Trade*)

The nature and order of magnitude of international business; global patterns of trade and investment; international and national institutions; policy issues, trends. (Fall and spring)

256 **Seminar: International Trade** (3) Grub, Eldridge

Classical and modern concepts of international trade theory, instruments and institutions of trade policy, barriers to trade, preferential treatment and trading blocs, trends and issues. (Fall and spring)

257 **Operation of the Multinational Firm** (3) Grub, Velasco

International market entry and expansion; operating policies, procedures, and problems of multinational companies; developing executives for international business. Prerequisite: advanced Master's degree standing. (Fall and spring)

258 **Colloquium on International Business** (3) Grub

Primarily for doctoral students. Selected problems in international business with emphasis upon regionalism, trade barriers, investment incentives,

international organization, foreign aid and development assistance and its relation to trade with developing nations, and trade with the Communist Bloc. (Fall)

259 **Comparative Business Management** (3) Lauter

Primarily for doctoral students. Comparative analysis of business practices and management in different countries and economic systems. Generic characteristics of management and of business enterprises and how these are modified in different environments. Influence on the level of economic development, social structure, history, and culture of a country. Prerequisite: Mgt 201 or equivalent. (Spring)

260 **Economics for Management** (3)

Economic theory and its application in managerial decision-making; price theory, income and employment theory, related topics. Review of economic methodology.

261 **Managerial Microeconomics** (3) Black, Holland

Applications of economic theory and statistics to business decisions involving demand, production, cost, profits, investments, and inventories. Prerequisite: Econ 217, Mgt 203, Stat 111 and 112; or equivalent; or permission of instructor. (Fall and spring)

262 **Managerial Macroeconomics** (3) Black, Holland

Use of economic theory and statistics in business forecasting; interpretation of economic trends and developments; analysis of governmental economic policies. Prerequisite: Econ 218, Mgt 203, Stat 111 and 112; or equivalent; or permission of instructor. (Fall and spring)

264 **Economics of Production** (3) Black

Economics of production and manufacturing. Production functions; optimization of input mix with simple, multistage, and joint production; technological change, risk, uncertainty, progress functions. Prerequisite: Econ 101 or 217, Stat 111, college algebra or Mgt 203. (Fall)

265 **Seminar: Managerial Economics** (3) Black

Primarily for doctoral students. Special topics and applications of analytical tools to business decision-making and policy. Prerequisite: B Ad 261, 262; or permission of instructor.

275 **Seminar: Transportation** (3) J. Roman

Problems and special areas of interest in transportation. Prerequisite: B Ad 171 or permission of instructor. (Spring)

279 **Purchasing and Materials Management** (3) Page, Sherman

Industrial purchasing and materials management principles and practices. Organization and functions in materials management. Determination of requirements, source selection, buying practices, policies, and ethics.

280 **Procurement and Contracting** (3) Sherman, Benefield

Overview of procurement and contracting; emphasis on federal government buying policies, practices, and procedures.

282 **Government Contract Administration** (3) Sherman

Surveillance over contractor performance of contract. Rights and obligations: changes, suspension of work, default, convenience termination.

inspection, warranties, procedures for the settlement of controversies on government contracts. Prerequisite: B Ad 280 or permission of instructor.

283 **Pricing and Negotiation** (3) Sherman, Wender

Scope and objectives of negotiated procurement; preparation, conduct, and recording of negotiations; analysis of cost, price, profit, investment, and risk; cost principles; incentives; relationship of contract type to work requirements; techniques of negotiation. Prerequisite: B Ad 280 or permission of instructor.

284 **Procurement Data Management** (3) Sherman

Technical data and the procurement process; contract-controlling documentation, patent rights, rights in data, requirements determination and the acquisition of data, federal policies, contractor interests. Configuration management; control of changes. Prerequisite: B Ad 280 or permission of instructor.

285 **Systems Procurement and Project Management** (3) D. Roman, Tesko

Development and procurement of major systems. Project management. Procurement planning—from concept formulation through contract definition, development, and manufacture. Prerequisite: B Ad 280 or permission of instructor.

286 **Government Contracts** (2) (Same as Law 355)

For description of the course, see the *National Law Center* catalogue.

287 **Government Procurement Law** (2) (Same as Law 431)

For description of the course, see the *National Law Center* catalogue.

288 **Formation of Government Contracts** (2) (Same as Law 432)

For description of the course, see the *National Law Center* catalogue.

289 **Performance of Government Contracts** (2) (Same as Law 433)

For description of the course, see the *National Law Center* catalogue.

290 **Government Contract Claims and Litigation** (2) (Same as Law 434)

For description of the course, see the *National Law Center* catalogue.

291 **Seminar: Business Management** (3) Eastin

Primarily for doctoral students. Research on various phases of management as practiced in American industry. (Fall and spring)

293 **Business Research** (3) Dyer

Theory and practice in research methodology. Data sources and gathering, research models and designs, analysis and testing, controls, interpretation and presentation of findings. (Fall and spring)

295 **Business Decision Simulation** (3)

Managerial decision-making in a diversified firm in a simulated competitive environment in which a complex situation is played out using computers. Prerequisite: advanced Master's or doctoral degree standing.

297 **Business Policy Formulation** (3) Jessup, Page

(*Formerly Case Studies in Business Administration*)

Analysis of operational situations and policy issues. Developing and imple-

menting solutions to managerial problems. Prerequisite: advanced Master's degree standing. (Fall and spring)

298 **Readings in Business** (3)

Supervised readings in selected fields within business administration. Admission by permission of instructor. May be repeated once for credit. (Fall and spring)

299 **Thesis Seminar** (3)

Examination of thesis standards, research philosophy and methodology. (Fall and spring)

300 **Thesis Research** (3) Staff

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Business Administration general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Business Administration candidates. May be repeated for credit. (Fall and spring)

Chemistry

Professors C.R. Naeser, R.C. Vincent, R.E. Wood, T.P. Perros, W.E. Schmidt, D.G. White, J.B. Levy, Nicolae Filipescu

Associate Professors Bette Barton, A D Britt (*Chairman*), E.A. Caress, D.A. Rowley

Bachelor of Arts or *Bachelor of Science with a major in Chemistry* (*Departmental*).—The Department offers two undergraduate majors designed to give students broad training in the basic divisions of chemistry: analytical, inorganic, organic, and physical. *Major I* provides considerable concentration in chemistry. However, it permits a wider selection of electives and thus should meet the needs of students preparing to enter medicine, dentistry, or related fields. *Major II* is intended primarily for students preparing for graduate study in chemistry or those planning to enter the chemical profession and wishing to be certified to the American Chemical Society as having met the minimum requirements for professional training. Two foreign languages are recommended for students planning to do graduate work in chemistry.

The following requirements must be fulfilled:

1. Students in either Major I or Major II must meet the general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Humanities and Social Studies.

2. Prerequisite courses for Major I and Major II—Chem 11–12 and 22, or 15–16; Math 30, 31; Phys 1, 2.

3. (a) Required courses for Major I—B Sc 11–12 or Geol 21–22; Chem 111–12, 113–14, 122, 134, 141, 151–52, 153–54.

(b) Required courses for Major II—B Sc 11–12 or Geol 21–22; Chem 111–12, 113–14, 122, 141–42, 151–52, 153–54, 235; Math 32; one course selected from Chem 195, 207, 213, 221, 222, 251, Math 111, 139, Phys 161, 165, 175, Stat 197.

Twelve semester hours in French, German, Greek, Hebrew, Italian, Latin, Russian, or Spanish (students in Major II should elect German) are recommended for students in both Major I and Major II.

For graduation with Special Honors in Chemistry, application must be made at the beginning of the senior year. Registration in Chem 195 is required at that time.

Master of Science in the field of Chemistry.—Prerequisite: a Bachelor's degree with a major in Chemistry from this University, or an equivalent degree.

Required: the general requirements, pages 92–99. The required 30 semester hours of graduate work must include Chem 213 and 221, and at least two of the following: Chem 207, 236, and 251. The thesis requirement, Chem 299–300, may be in analytical, inorganic, organic, or physical chemistry. Chem 156, or its equivalent, is prerequisite to research work in the field of organic chemistry. All graduate students are required to participate in the seminar program (Chem 291) and colloquium program. A reading knowledge examination in French, German, or Russian (German or Russian preferred) must be passed prior to beginning the third semester of graduate work or before the second half of the work is started, whichever occurs first. A student who intends to become a doctoral candidate is strongly urged to take Chem 207 as early as possible in his graduate program.

Master of Science in the field of Geochemistry (an interdepartmental degree offered by the departments of Chemistry and Geology).—Prerequisite: a Bachelor's degree with a major in Chemistry or in Geology from this University, or an equivalent degree.

Required: the general requirements, pages 92–99, including Chem 111–12; Geol 141, 241, 249; Chem 213 or Geol 246; and Chem 299–300. The Master's Comprehensive Examination must be taken before registration for the second half of the thesis work. A reading knowledge examination in a foreign language, approved by the Department of Chemistry or Geology, must be passed prior to beginning the third semester of graduate work or before beginning the thesis work, whichever occurs first.

Doctor of Philosophy in the field of Chemistry.—Required: the general requirements, pages 92–96, 99–101. Chem 207, 213, 221, 235, 251, and 350 are normally required of the doctoral student, in addition to other courses as determined by consultation with the Departmental program committee. The tool requirement options are (1) a foreign language reading examination in German and either French or Russian or (2) a foreign language reading examination in German and a demonstrated proficiency in computer programming. The latter option is required for students in physical or theoretical chemistry. Cumulative examinations replace the "General Examination" requirement.

Research fields: Analytical Chemistry, Inorganic Chemistry, Organic Chemistry, Physical Chemistry (Electrochemistry, Kinetics, Magnetic Resonance, Theoretical), Physical Organic Chemistry (Reaction Mechanisms), and Structure and Synthesis of Natural Products.

Doctor of Philosophy field of study in Geochemistry (an interdepartmental field offered by the departments of Chemistry and Geology.)—Required: the general requirements, pages 92–96, 99-101, including a reading knowledge examination in an approved foreign language plus the satisfactory completion of Stat 117 and 118, or 49; and the satisfactory completion of the General Examination in four fields, including chemistry and geochemistry.

Bachelor of Arts in Education with a teaching field in Chemistry.—Prerequisite: the Education curriculum, page 78.

Required: the Chemistry option and professional courses on pages 110–11, 119.

Graduate Placement Examinations: All entering students in the Master's and Doctoral programs in the field of Chemistry are required to take the American Chemical Society Graduate Level Placement Examinations, given by the Department of Chemistry, prior to registration in the Graduate School of Arts and Sciences. The four placement examinations (in the disciplines of analytical, organic, inorganic, and physical chemistry) are of the multiple-choice type. These tests are designed to cover the subject matter in the disciplines generally taught in modern undergraduate programs preparatory for graduate work in chemistry, and the results are used by the Department to advise the individual student in planning a program of courses appropriate to his background.

Registration: Before completing registration each student must obtain from the representative of the Department an assignment to lecture, recitation, and laboratory sections. The work of the junior and senior years must be approved by the Department.

PHYSICAL SCIENCE

FIRST GROUP

3–4 **Fundamentals of Physical Science** (3–3) Barton, Filipescu

For nonscience majors. Lecture (2 hours), laboratory (3 hours). Selected topics from chemistry, physics, astronomy, and geology are integrated to introduce the nonscience major to the basic methods and achievements of physical science. Laboratory fee, $15 a semester. (Academic year)

CHEMISTRY

FIRST GROUP

11–12 **General Chemistry** (4–4) Staff

Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Elementary course in general chemistry, including qualitative analysis. Prerequisite to Chem 12: Chem 11: one year of high school algebra. Prerequisite to Chem 12: Chem 11. Laboratory fee, $21 a semester. (Chem 11 and 12—fall and spring)

13 **General Chemistry** (4) Britt

For School of Engineering and Applied Science students only. Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Atomic structure; chemical bonding; chemical equations; acids and bases; chemical equilibrium; liquid and solid states; periodicity; electrochemistry; organic chemistry. Prerequisite: Math 31, Phys 2. Laboratory fee, $21. (Fall)

15–16 **Intensive General and Analytical Chemistry** (Honors Course) (4–4) Rowley

Chem 15: lecture (3 hours), laboratory (3 hours), recitation (1 hour). Chem 16: lecture (2 hours), laboratory (6 hours), recitation (1 hour). Equivalent to Chem 11–12 and 22, but with selected topics studied in depth. Prerequisite to Chem 15: high school physics and chemistry. Prerequisite to Chem 16: Chem 15. Admission by placement test prior to registration or on basis of College Board Advanced Placement Examination. Laboratory fee, $21 a semester. (Academic year)

22 **Introductory Quantitative Analysis** (4) Vincent

Lecture (2 hours), laboratory (6 hours). Theory and practice of quantitative analysis by classical methods; introduction to instrumental analysis. Prerequisite: Chem 12. Laboratory fee, $21. (Fall and spring)

50 **Introduction to Organic Chemistry** (4) Caress

Lecture (3 hours), laboratory (3 hours). A terminal course for students in related disciplines. This course does not fulfill the organic chemistry requirement for chemistry majors or premedical students. Prerequisite: Chem 12 or 16. Laboratory fee, $21. (Spring)

SECOND GROUP

110 **Introduction to Physical Chemistry** (3) Wood

Topics include chemical thermodynamics, chemical kinetics, electrochemistry, solution chemistry, membrane and phase equilibria, and others. Prerequisite: Chem 16 or 22, Math 31, Phys 2; or permission of instructor. Not open to chemistry majors. May not be taken for credit by students who have received credit for Chem 111–12 or an equivalent course.

111–12 **Physical Chemistry** (3–3) Wood

Gas laws, chemical thermodynamics, solution chemistry, chemical equilibrium, kinetics, chemical statistics, electrochemistry, and other topics. Prerequisite to Chem 111: Chem 16 or 22; Math 31; Phys 2. Prerequisite to Chem 112: Chem 111. (Academic year)

113–14 **Physicochemical Measurements** (2–2) Wood, Barton, Schmidt

Laboratory complement to Chem 111–12 and 122. Prerequisite or concurrent registration for Chem 113: Chem 111. Prerequisite or concurrent registration for Chem 114: Chem 112, 113, and 122. Laboratory fee, $21 a semester. (Academic year)

122 **Instrumental Analysis Lectures** (2) Schmidt

Theory of instrumental methods in qualitative and quantitative analysis, determination of structure, and study of reaction mechanisms with emphasis on electroanalysis, spectrophotometry, and chromatography. Correlated with Chem 114. Prerequisite or concurrent registration: Chem 112. (Spring)

134 **Descriptive Inorganic Chemistry** (2) Rowley

Intermediate-level course emphasizing the descriptive chemistry of the elements. Prerequisite: Chem 16 or 22, 152. Prerequisite or concurrent registration: Chem 111. (Fall)

141–42 **Advanced Experimental Chemistry** (2–2) White, Caress

Designed to provide the chemistry major with facility in experimental methods common to all disciplines of chemistry. Prerequisite: Chem 154. Prerequisite or concurrent registration: Chem 111. Laboratory fee, $21 a semester. (Academic year)

151–52 **Organic Chemistry** (3–3) Staff
(*Formerly Chem 51–52*)

Chemistry of the compounds of carbon. Prerequisite to Chem 151: Chem 12 or 16. Prerequisite to Chem 152: Chem 151. (Academic year)

153–54 **Organic Chemistry Laboratory** (1–1) Staf
(*Formerly Chem 53–54*)
Laboratory complement of Chem 151–52. Prerequisite or concurrent re
istration: Chem 151–52. Prerequisite to Chem 154: Chem 153. Labora
tory fee, $21 a semester. (Academic year)

156 **Qualitative Organic Analysis** (3) Carey
Lecture (1 hour), laboratory (6 hours). Identification of pure organ
compounds, separation of mixtures, and identification of their component
Required of all students planning research work in organic chemistry. Pre
requisite: Chem 16 or 22, 154. Laboratory fee, $21. (Spring)

191 **History of Chemistry** (2) Perro
Historical development of chemistry. Prerequisite: Chem 12 or 16.
(Fall 1973 and alternate falls)

195 **Undergraduate Research** (1 or 2) Staf
Research on problems approved by the Staff. May be repeated once fo
credit. Laboratory fee, $10.50 a semester hour. (Fall and spring)

THIRD GROUP

207 **Chemical Bonding** (3) Barto
Introduction to quantum chemistry. Molecular orbital theory, atomic an
molecular structure, spectroscopy. Prerequisite: Chem 112. (Fall)

211–12 **Physical Chemistry** (2–1) Woo
Same as Chem 111–12. Admission only by departmental permissio
Credit assigned upon satisfactory completion of Chem 213. (Academi
year)

213 **Chemical Thermodynamics** (3) Woo
Application of thermodynamics to chemical problems. Thermochemistr
homogeneous and heterogeneous equilibria, statistical calculation of the
modynamic properties, electrochemistry. Prerequisite: Chem 112 or 21
(Spring)

216 **Statistical Mechanics as Applied to Chemistry** (3) Barto
Introduction to classical and quantum statistics designed to acquaint th
student with basic principles and application of method. Prerequisite
concurrent registration: Chem 207 or permission of instructor.
(Spring 1974 and alternate springs)

217 **Theory of Magnetic Resonance** (3) Barto
(*Replaces Chem 214 Principles of Magnetic Resonance (3), and Che
215 Quantum Chemistry (3)*)
Application of quantum theory and the techniques of magnetic resonanc
to chemical problems; emphasis on the connection between theory an
experiment. Molecular motion, relaxation theory, bonding, etc. Pr
requisite: Chem 207 or permission of instructor. (Spring 1975 an
alternate springs)

219 **Spectrochemistry** (3) Filipes
Energetic states of molecules under the influence of electromagnetic radia
tion and their relation to structures and spectroscopic properties. Pr

requisite: Chem 207 and 221, or permission of instructor. (Spring 1975 and alternate springs)

221 **Advanced Analytical Chemistry I** (3) Britt

Theory and application of recent spectrometric methods of analysis, including electrical, magnetic, and optical instrumentation. Prerequisite: Chem 122. (Fall)

222 **Advanced Analytical Chemistry II** (2 or 3) Schmidt

Lecture (2 hours), laboratory (3 hours—optional). Theory and application of electroanalysis and separations by physicochemical methods. Prerequisite: Chem 122. Laboratory fee, $10.50. (Spring 1974 and alternate springs)

233 **Organometallic Chemistry** (3) White

Survey of organometallic compounds with emphasis on the compounds of lithium, boron, aluminum, silicon, the transition metals, and the catalytic role of certain organotransition metal complexes. Prerequisite: Chem 236 and 251, or permission of instructor. (Spring 1974 and alternate springs)

235–36 **Advanced Inorganic Chemistry** (3–3) White

Application of modern chemical theories to inorganic substances and reactions followed by a detailed study, developed from the periodic table, of the chemistry of the more common elements. Prerequisite to Chem 235: Chem 112, 152. Prerequisite to Chem 236: Chem 235. (Academic year)

237 **Physical-Inorganic Chemistry** (3) Rowley

Quantitative application of modern theories for interpretation and explanation of the electronic properties of transition-metal complexes. Prerequisite: Chem 112 and 134, or Chem 235. (Fall 1973 and alternate falls)

238 **Topics in Transition Metal and Inner-transition Metal Chemistry** (3) Perros

A systematic study of the significant and distinctive properties of the transition and inner-transition elements in relation to their positions in the periodic table. Prerequisite: Chem 236. (Fall 1974 and alternate falls)

251–52 **Advanced Organic Chemistry** (3–3) Filipescu

Synthesis, reactions, and properties of organic compounds; fundamental theories of organic chemistry, emphasis on reaction mechanisms. Prerequisite to Chem 251: Chem 112, 152. Prerequisite to Chem 252: Chem 251. (Academic year)

257 **Physical-Organic Chemistry** (3) Levy

The transition state theory of chemical kinetics, applications to reaction mechanisms; kinetic isotope effects, linear-free energy relationships, concentrated and "super" acids, Woodward-Hoffman rules, free radical reactions. Prerequisite: Chem 252 or permission of instructor. (Fall 1973 and alternate falls)

258 **Synthesis and Structure Determination in Organic Chemistry (3)**
(*Formerly Natural Products*)
Methods of structure determination and synthesis of complex organic molecules. Prerequisite: Chem 251 or permission of instructor. (Fall 1974 and alternate falls)

291 **Seminar: Recent Developments in Chemistry** (0)
All graduate students are required to participate in this seminar throughout their period of residence in the Department. No academic credit. No tuition fee required. (Fall and spring)

295 **Research** (arr.)
Research on problems approved by the staff. Open to qualified students with advanced training. May be repeated for credit not to exceed a total of 8 semester hours. Laboratory fee, $10.50 a semester hour. (Fall and spring)

299–300 **Thesis Research** (3–3)
Laboratory fee, $21 a semester. (Fall and spring)

FOURTH GROUP

350 **Choice and Design of a Research Problem** (1)
Development in written form of an original research plan, fully referenced, and its oral defense. (Fall and spring)

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy cumulative examinations. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Chinese

See "East Asian Languages and Literatures."

Classics

Associate Professor J.E. Ziolkowski *(Chairman)*
Associate Professorial Lecturers A.B. Seidman, Mary Norton
Assistant Professor Mary Xiroyanni
Assistant Professorial Lecturer Zvi Porath

Bachelor of Arts with a major in Classical Humanities (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87.
2. Prerequisite courses—Clas 1–2, 3, 4; or equivalent; or Clas 11–12, 13, 14; Clas 71, 72.

3. Required courses in the major—Clas 108, 113, 127, 138; Art 101 or 102, 11; Hist 109, 110; and either Hist 105 or Phil 111.

Bachelor of Arts with a major in Latin (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87.
2. Prerequisite courses—Clas 1–2, 3, 4; or equivalent.
3. Required courses in related areas—Art 111; Hist 109, 110; and either Hist 05 or Phil 111. (A reading knowledge of French and German is recommended.)
4. Required courses in the major—22 semester hours in second-group Latin courses, including Clas 131–32, 138.

Bachelor of Arts with a major in Classical Archaeology and Classics (Departmental).—An interdepartmental major arranged in conjunction with the Department of Art. The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Natural and Mathematical Sciences.)
2. Prerequisite courses—Clas 1–2, 3, 4; or Clas 11–12, 13, 14.
3. Required courses in the major—Art 101, 102, 103, 111; Hist 109, 110; 14 semester hours in second-group courses in Greek or Latin, including Class 138. (A reading knowledge of French and German is recommended.)

Master of Arts in the field of Classical Archaeology, Classics, and History (an interdepartmental degree program offered by the departments of Art, Classics, and History).—Prerequisite: a Bachelor's degree with a background in Classical Archaeology and either Greek or Latin. Applicants from other institutions must present scores on the Graduate Record Examination to the Office of the Graduate School of Arts and Sciences.

Required: the general requirements, pages 92–99. The program of study consists of 24 semester hours of course work (as many as possible should be third-group courses) selected in consultation with the appropriate adviser from the departments of Art, Classics, and History; plus a thesis (equivalent to 6 additional semester hours). Candidates must pass a reading knowledge examination in French or German. All candidates are required to pass a general Master's Comprehensive Examination.

LATIN AND GREEK

FIRST GROUP

1–2 **Beginning Latin** (3–3) Staff
(*Formerly First-year Latin*)
A year course: credit toward a degree at this University given on completion of Clas 2. Grammatical essentials of the language, appropriate reading selections, development of English derivatives, introduction to Roman life and literature. (Academic year)

3 **The Life and Times of Ovid** (3) Staff
(*Formerly Second-year Latin*)
Selections from Ovid's mythological and love poetry—in Latin; discussion of the culture of the Augustan Age. Prerequisite: Clas 1–2 or equivalent. (Fall)

4 **Vergil's Aeneid** (3) Staff
(*Formerly Second-year Latin*)
Significant passages of Vergil's famous epic—in Latin; reading and dis-

cussion of the entire poem in translation. Prerequisite: Clas 3 or p mission of instructor. (Spring)

11–12 **Beginning Greek** (3–3) Ziolkowsk
(*Formerly First-year Greek*)
A year course: credit toward a degree at this University given on compl tion of Clas 12. Introduction to Homeric Greek; emphasis on gramm and vocabulary to prepare the student to read Greek epic poetry. (Academic year)

13 **The Last Days of Socrates** (3) Staf
(*Formerly Second-year Greek*)
The *Apology* of Plato—in Greek; reading and discussion of other Socrat dialogues. Prerequisite: Clas 11–12 or equivalent. (Fall)

14 **Readings in Greek Literature** (3) Staf
(*Formerly Second-year Greek*)
Greek text of moderate difficulty (e.g., Herodotus or the New Testament) emphasis on the literary and cultural value of the original. Prerequisite Clas 13 or permission of instructor. (Spring)

SECOND GROUP

101–2 **Latin Prose and Poetry** (3–3) Staf
Selections from a wide variety of Latin authors of prose and poetry. Pre requisite: Clas 3, 4; or equivalent.

109–10 **Major Latin Authors** (3–3) Norton
Selections from one or two major authors will be read each semester May be repeated for credit. Prerequisite: Clas 101–2 or permission o instructor. (Academic year)

131–32 **Latin Prose Composition** (1–1) Norton
Exercises in Latin prose composition for Latin majors. Other students may enroll by permission of instructor.

134 **Medieval Latin** (3) Andrew
Selections from the Vulgate and representative Latin writers through the 11th century. Prerequisite: Clas 3, 4; or permission of instructor. May be taken for graduate credit with approval of instructor. (Spring)

135–36 **Survey of Latin Literature** (3–3) Staf
Latin literature in historical sequence. (Academic year)

139–40 **Major Greek Authors** (3–3) Ziolkowski
Selections from a wide variety of Greek prose, drama, and poetry, suited to the needs of the class. May be repeated for credit with permission o instructor. Prerequisite: Class 14. (Academic year)

141–42 **Greek Prose Composition** (1–1) Staf
Exercise in Greek prose composition. Prerequisite: Clas 12 and permis sion of instructor. (Academic year)

COURSES IN ENGLISH TRANSLATION

FIRST GROUP

64 **Greek and Latin Origins of English Words** (3) Staff

Study of Greek and Latin roots in English to improve vocabulary and facilitate understanding of the language of science, philosophy, politics, etc. Survey of the historical contact between Latin and English.

71 **Survey of Greek Literature** (3) Ziolkowski

(*Formerly Greek and Roman Epic, History, and Biography*)

Survey of important works in Greek literature from Homer to Lucian. Study of Greek literature in its historical context, emphasis on various literary genres. Students who receive credit for Clas 105 cannot receive credit for Clas 71. (Fall)

72 **Survey of Latin Literature** (3) Ziolkowski

(*Formerly Greek and Roman Poetry, Philosophy, and Satire*)

Survey of Latin literature from the third century B.C. to the third century A.D. Readings from Plautus, Catullus, Cicero, Horace, Vergil, Tacitus, and Petronius. Students who receive credit for Clas 105 cannot receive credit for Clas 72. (Spring)

SECOND GROUP

105 **Survey of Classical Humanities** (3) Norton

Representative masterpieces of Greek and Roman literature: epic, lyric, dramatic, philosophical, and historical. Students who receive credit for Clas 71 or 72 cannot receive credit for Clas 105.

108 **Classical Mythology** (3) Norton

Mythology of the Greeks and Romans from the creation of the world: tales of the gods, heroes, and great families that have influenced literature, art, and music. (Spring)

113 **Greek and Roman Drama** (3) Norton

Selected masterpieces of Greek and Roman tragedy and comedy. (Fall)

127 **Classical Influence on Western Civilization** (3) Ziolkowski

A survey of Greek and Roman influence on Western civilization relevant to modern America: literature, art, law, science, philosophy, etc. Prerequisite: at least one 3-semester-hour survey course in Greek or Roman literature. (Spring)

138 **Introduction to Classical Studies** (2) Beers

Survey of the broad range of sources and resources involved in pursuing classical studies: standard references, periodicals, library holdings, papyrology, textual criticism, history of classical scholarship.

HEBREW

FIRST GROUP

21–22 **Beginning Hebrew** (3–3)
(*Formerly First-year Hebrew*)
A year course: credit toward a degree at this University given on co
tion of Clas 22. Elementary Hebrew grammar, readings from the
Testament and contemporary literature, composition and convers
(Academic year)

23–24 **Intermediate Hebrew** (3–3)
(*Formerly Second-year Hebrew*)
Review of grammar; continued development of reading comprehen
composition, and conversation. (Academic year)

SECOND GROUP

103–4 **Advanced Hebrew** (3–3)
Readings in poetry, prose, Mishnaic Hebrew; survey of Semitic cha
and origins; Biblical comparison with Dead Sea Scrolls; required rese
paper in Hebrew. (Academic year)

Drama

See "Speech and Drama."

East Asian Languages and Literatures

Professor Chung-wen Shih (*Acting Chairman*)
Associate Professorial Lecturers Jane Evans, Thomas Lawton
Assistant Professors G.C.Y. Wang, D.L. Lee, P.L. Sargent (*Visiting*)

*Bachelor of Arts with a major in Chinese Language and Literature in Columbi
College of Arts and Sciences (Field-of-Study).*—The following requirements m
be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87, including Asia 1–
3–4, and 9; or Asia 7–8 and 9; or Asia 5–6 (preferred).
2. The completion of Asia 11–12, 103, 105, 165, 167, and the passing of
major examination at the end of the senior year. The coordinated field of knowled
upon which the student will be examined includes an active command of mode
Chinese language and a general knowledge of Chinese literature and culture.
proseminar (Asia 199–200) assists the student in preparation for the major examin
tion.

*Bachelor of Arts with a major in Chinese Language and Literature in the Schoo
of Public and International Affairs.*—See pages 164–68.

Bachelor of Arts with a major in Chinese Studies.—See pages 164–68, 169.

CHINESE

FIRST GROUP

*1–2 **Beginning Mandarin Chinese, Level I** (3–3) Wang

Classroom (3 hours), laboratory (1 hour). Fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Asia 2: Asia 1. Laboratory fee, $17.50 a semester. (Academic year)

*3–4 **Beginning Mandarin Chinese, Level II** (3–3) Wang

Classroom (3 hours), laboratory (1 hour). Continuation of grammar and spoken Chinese with more emphasis on the written language and reading. Prerequisite to Asia 3: Asia 2 or equivalent. Prerequisite to Asia 4: Asia 3. Laboratory fee, $17.50 a semester. (Academic year)

5–6 **Beginning Intensive Mandarin Chinese, Levels I-II** (8–8) Lee

Intensive beginner's course in fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Asia 6: Asia 5. Laboratory fee, $17.50 a semester. (Academic year)

*7–8 **Beginning Intensive Mandarin Chinese** (6–6) Lee

Intensive beginner's course in fundamentals of reading and practice in writing. Prerequisite to Asia 8: Asia 7. Laboratory fee, $17.50 each session.

*9 **Beginning Mandarin Chinese, Level II** (4) Wang

Reading of simple modern expository writings. Analysis of syntactic structure and practice in writing. Prerequisite: Asia 4 or 8. Laboratory fee, $17.50. (Fall or spring)

11–12 **Intermediate Intensive Mandarin Chinese** (6–6) Staff

Reading basic texts, writing short pieces, conversation, systematic review of grammar. Prerequisite to Asia 11: Asia 6 or 9. Prerequisite to Asia 12: Asia 11. Laboratory fee, $17.50 a semester. (Academic year)

SECOND GROUP

103 **Intensive Readings in Modern Chinese** (6) Shih, Sargent

Intensive readings in selected modern literary works, social sciences, and documentary materials. Prerequisite: Asia 12 or equivalent. (Fall)

105 **Introduction to Classical Chinese (Intensive)** (6) Shih, Sargent

Introduction to classical writing in Chinese literature, history, and philosophy. Prerequisite: Asia 6 or 9. (Spring)

123–24 **Introduction to Chinese Linguistics** (3–3) Staff

Introduction to the history of the Chinese language. Analysis of linguistic structure of modern spoken Chinese and classical Chinese. Prerequisite: Asia 4 or equivalent, or a course in linguistics.

* The combination of Asia 1-2, 3-4, and 9, or the combination of Asia 7-8 and 9, is equivalent to Asia 5-6.

171–72 **Poetry of the T'ang and Sung Periods** (3–3)
Reading of works of leading poets. Discussion of content and style. requisite: Asia 103 or equivalent.

173 **Yüan Drama** (3)
Readings of plays by Kuan Han-ch'ing, Ma Chih-Yüan, Cheng Kuo chu, Po P'u, and Wang Shih-fu. Prerequisite: Asia 103 or equivalent.

177–78 **Prose Narratives of the Sung, Ming, and Ch'ing Periods** (3–3)
Short stories of the Sung period. Selected readings of Ming-Ch'ing nov Historical development and stylistic traits. Prerequisite: Asia 103 or equ alent.

179–80 **20th Century Chinese Literature** (3–3)
Short stories of Lu Hsün, Lao She, and others. Informal essays by Hsün, Chou Tso-jen, and Chu Tzu-ch'ing. Drama of T'ien Han Ts'ao Yü. Prerequisite: Asia 103 or equivalent.

185–86 **Directed Reading** (3–3)
Reading of material in the student's field of interest. Admission by mission of instructor. (Academic year)

199–200 **Proseminar: Readings for the Major in Chinese Language and Literature** (3–3)
Conferences and group discussions. (Academic year)

EAST ASIAN LITERATURE IN TRANSLATION

FIRST GROUP

91–92 **Introduction to East Asian Literature** (3–3) Evans, Sarg
Lecture and discussion. Survey of Chinese and Japanese literature, fr earliest periods through literary masterpieces of the early 20th centu

SECOND GROUP

161 **Chinese Culture** (3)
Lecture and discussion. Survey of Chinese cultural heritage from ancie times to present. (Fall and spring)

166 **Chinese Poetry in Translation** (3)
Open to students who have no knowledge of the Chinese language. G eral survey of the development of Chinese poetry from ancient ti to present. (Fall)

167 **Chinese Fiction in Translation** (3)
Open to students who have no knowledge of the Chinese language. Re ing of major novels, including *All Men Are Brothers, Golden Lot Dream of the Red Chamber,* and *The Travels of Lao Ts'an.* (Sprin

JAPANESE

FIRST GROUP

21–22 **Beginning Intensive Japanese** (8–8) Staff

Intensive beginner's course in fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Asia 22: Asia 21. Laboratory fee, $17.50 a semester. (Academic year)

Economics

Professors A.E. Burns, J.W. Kendrick, C.T. Stewart, Jr., C.E. Galbreath, Joseph Aschheim, R.P. Sharkey, Henry Solomon (*Chairman*), Sar Levitan, Louis De Alessi, Theodore Suranyi-Unger, Jr. (*Research*), Ching-Yao Hsieh, J.L. Gastwirth

Adjunct Professors T.F. Carroll, H.P. Miller, Joseph Grunwald

Professorial Lecturers John Hardt, Eleanor Hadley, Leon Greenberg

Associate Professors Mary Holman, R.Y.C. Yin, W.F.E. Long, S.E. Haber, R.M. Dunn, Jr., G.C. Eads, R.S. Goldfarb

Associate Professorial Lecturers H.H. Hinrichs, William Poole

Assistant Professors J.T. Bennett, J.E. Fredland, J.R. Barth, A.M. Yezer

Assistant Professorial Lecturers C.S. Carson, F.W. Segel

Bachelor of Arts with a major in Economics (*Departmental*).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Humanities and the Natural and Mathematical Sciences.)
2. Prerequisite course—Econ 1–2.
3. Required courses in related areas—Math 51 and 52; Stat 111 and 112, or equivalent; 6 semester hours of a Social Study other than Economics.
4. Required courses in the major—Econ 101, 102, 121, 198, and 15 additional semester hours of second-group Economics courses to be approved by the departmental adviser.

Master of Arts in the field of Economics.—Prerequisite: a Bachelor of Arts degree with a major in Economics from this University, or an equivalent degree. Required: the general requirements, pages 92–99, including (1) Econ 203–4, 205; (2) 3 semester hours in Statistics; (3) 12 additional semester hours to be selected from other third-group Economics courses; (4) a Master's Comprehensive Examination in economic theory; (5) completion of a tool requirement (either the passing of a reading knowledge examination in one foreign language or the satisfactory completion of one of the following courses: Math 124, Stat 97, or Stat 157–58); and (6) a thesis (Econ 299–300).

Doctor of Philosophy in the field of Economics.—Required: the general requirements, pages 92–96, 99–101, including (1) Econ 202, 203–4, 205, 215–16, 379 or 380, and 27 additional semester hours of approved graduate course work which must include 3 semester hours in Statistics; (2) passing of the General Examination in Microeconomic Theory, Macroeconomic Theory, and two other fields selected by the student and approved and by the doctoral program committee; (3) completion of the tool requirement (the passing of a reading knowledge examination in one foreign language plus the satisfactory completion of Math 124, Stat 97, or Stat 157–58; and

(4) a dissertation to demonstrate the candidate's ability to do original research in one of the following fields: Econometrics, Economic Development, Economic History, Economic Policy, Economic Theory, Environmental Economics, History of Economic Thought, Industrial Organization, International Economics, Labor Economics, Mathematical Economics, Monetary Economics, National Income Accounting, Natural Resources Economics, Public Finance, Regional and Urban Economics, and Soviet Economics.

Departmental prerequisite: Econ 1–2 is prerequisite to all other courses in Economics except Econ 217–18.

FIRST GROUP

1–2 **Principles of Economics** (3–3)
Lecture (2 hours), recitation (1 hour). Survey of the major economic principles, institutions, and problems in contemporary life. Econ 1 prerequisite to Econ 2. (Econ 1 and 2—fall and spring)

SECOND GROUP

101 **Intermediate Microeconomic Theory** (3)
Analysis of supply, demand, and pricing. (Fall and spring)

102 **Intermediate Macroeconomic Theory** (3)
Theories of national income determination and growth. (Fall spring)

104 **History of Economic Thought** (3)
History of the major schools of economic thought, influence of chang problems on the development of economic theory. (Spring)

105 **Economics Condition Analysis and Forecasting** (3)
Theory and empirical analyses of economic trends and fluctuations, of economic indicators and simple econometric models, workshop exper ence in an analysis of an aspect of the U.S. economy. (Fall)

121 **Money and Banking** (3)
Nature of money, credit, commercial banking, and other financial insti tions in the U.S. monetary system. (Fall and spring)

122 **Monetary Theory and Policy** (3)
Analysis of role of money in economic activity in terms of supply of m demand for loanable funds, interest rates and price level. Problems U.S. monetary policy. Prerequisite: Econ 121. (Spring)

*123 **Introduction to Econometrics** (3)
Construction and testing of economic models: regression theory, para eter estimation, and statistical techniques applicable to economic mode Prerequisite: Econ 101, 102; Math 31 or 51; Stat 111. (Spring)

133 **Economy of the Soviet Union** (3)
Development and main features of economic life in the Soviet Un (Fall)

* Interdepartmental course offered by the departments of Economics and Statistics.

134 **Comparative Communist Economic Systems** (3) Hardt

Analysis of economic development and performance of the Soviet Union and other Soviet-type economies. Institutional aspects and quantitative measures of performance. (Spring)

136 **Natural Resources and Environmental Economics** (3) Holman

Analysis of economic problems of natural resources development and utilization and environmental quality. (Spring)

142 **Labor Economics** (3) Haber

Characteristics of American labor force, operations of labor market, wage theories and practices, impact of collective bargaining, causes and characteristics of unemployment, public policies and programs. (Fall)

*147 **Economic History of Europe** (3) Sharkey

European economic development since the Middle Ages; emphasis on the period following the Industrial Revolution. Evolution of capitalism and its impact upon the societies of Europe.

157 **Regional and Urban Economics** (3) Yezer

Analysis of the processes of interregional interaction, the urban hierarchy, urban structure, and policies for regional and urban development. (Spring)

158 **Industrial Organization** (3) Eads

Analysis of the structures and production, pricing, and related practices of industries with emphasis on their significance and on appropriate economic policies. (Spring)

161 **Public Finance I** (3) Fredland

Theoretical and institutional analysis of government expenditures, taxation, and intergovernmental fiscal relations. (Fall)

162 **Public Finance II** (3) Fredland

Theoretical and institutional analysis of fiscal policy and debt management. (Spring)

165 **Economics of Human Resources** (3) Stewart
(*Formerly Economic Policy*)

Economic analysis of education and training, medical care, research and development, and other contemporary problems. (Fall)

169 **Introduction to the Economy of Communist China** (3) Yin

Background, organization, and operation of the economy. Appraisal of performance and analysis of problems of development. (Fall)

170 **Introduction to the Economy of Japan** (3) Hadley

Analysis of the structure and growth of the Japanese economy. (Spring)

179–80 **U.S. Economic History** (3–3) Sharkey

Process of economic growth from Colonial times to the present. Development of various sectors in the economy and their interdependence. Econ 179: 1607–1865. Econ 180: 1865 to present. (Academic year)

*Interdepartmental course offered by the departments of Economics and History.

181–82 **International Economics** (3–3) Galbreath, D

Econ 181: international trade theory and international monetary the
Econ 182: continuation of international monetary theory; economic
velopment. (Academic year)

185–86 **Economic History and Problems of Latin America** (3–3) S

Analysis of present structures and problems of Latin American eco
mies. (Academic year)

198 **Proseminar in Economics** (3) Holman, L

Examination of major topics in economic theory and the applicatio
theory and analysis to policy problems. Open only to economics ma
in their senior year. (Fall and spring)

199 **Independent Research in Economics** (3) S

Under the personal direction of an instructor. Limited to economics
jors with demonstrated capacity. Prior approval of instructor requi
(Fall and spring)

THIRD GROUP

Third-group Economics courses (except 217–18) are designed for graduate stud
in Economics or for graduate students with prescribed prerequisites.

202 **History of Economic Thought** (3) Burns, H

(*Formerly 201–2 History of Economic Thought (3–3)*)

Critical analysis and interpretation of the development of econo
theory from the 17th century to the present. (Fall and spring)

203–4 **Microeconomic Theory** (3–3) De Al

Econ 203: theories of the consumer and of the firm. Econ 204: theo
of markets. (Econ 203 and 204—fall and spring)

205 **Macroeconomic Theory** (3) Hsieh, Po

Classical, Keynesian, and modern theories of income determination a
employment. (Fall and spring)

207 **Business Cycle Analysis** (3) Kendr

Empirical analysis of American business cycles; evaluation of the m
odology and findings of the National Bureau of Economic Research. S
tistical tests of theories of the business cycle. (Spring)

208 **National Income** (3) Kendr

Theory and measurement of economic aggregates within an integrated
tional income accounts framework, including balance sheets and wea
statements. (Spring)

210 **Economic Methodology** (3) Stev

Methodology of economics, review of selected theoretical issues in e
nomic theory. Prerequisite: 6 semester hours of graduate courses in e
nomic theory. (Spring)

215–16 **Mathematical Economics** (3–3) Solo

Formulation and application of mathematical models in economic theo
Prerequisite: a one-year calculus sequence. (Academic year)

217–18 **Survey of Economics** (3–3) Holman

For graduate students in fields other than economics. Econ 217: price theory. Econ 218: income and employment theory. Departmental prerequisite waived. (Econ 217 and 218—fall and spring)

223–24 **Monetary Theory and Policy** (3–3) Aschheim

Theory of monetary policy within the framework of contemporary American central banking. (Academic year)

233 **Seminar: Agrarian Reform and Development in Latin America** (3) Carroll

Analysis of Agrarian reform movements and programs in the context of current development issues in Latin American countries. (Fall)

234 **Seminar: Evaluation of Rural Development Projects in Latin America** (3) Carroll

Review of criteria for the design and evaluation of rural investment projects; case studies drawn from the experience of development agencies. (Spring)

237 **Seminar: Economics of the Environment and Natural Resources** (3) Holman

Analysis of public policy problems relating to the environment and natural resources development and management. (Fall)

241–42 **Labor Economics** (3–3) Haber

Analysis of labor markets, theories of wages, impact of collective bargaining, causes of unemployment, public policies and programs. (Academic year)

243 **Seminar: Manpower Policy** (3) Levitan

Developments leading to expansion of public investment in manpower resources; evaluation of goals and operations of publicly supported programs. (Fall)

251–52 **Economic Development** (3–3) Grunwald

Theories and problems of economic growth; special attention to the underdeveloped countries. (Academic year)

253 **Productivity Analysis** (3) Kendrick

Concepts, measurement, and analysis of productivity in business and government at aggregate and organizational levels. (Fall)

257 **Regional and Urban Economics** (3) Stewart

Theory of location of economic activities, analysis of interregional equilibrium and dynamics of regional growth, structure and processes of urban development. (Spring)

259 **Income Distribution** (3) Miller

Theoretical and empirical analysis of income distribution, including analysis of policies related to income inequality. Open to advanced undergraduate Economics majors. (Fall)

261 **Welfare Economics** (3) Stewa

Theories of welfare economics and their applications to public polic analysis of selected topics in public policy. (Fall)

263 **Theory of Public Finance I** (3) Fredla

Allocation and distribution aspects of government budget policy, includi critical analysis of theories and principles of expenditures, taxation, a intergovernmental fiscal relations. (Fall)

264 **Theory of Public Finance II** (3) Fredla

Stabilization aspects of government budget policy: analysis of effects fiscal policy and debt management on level of employment, prices, a rate of economic growth. (Spring)

265–66 **Industrial Organization** (3–3) Long, Ed

Structure and performance of the American economy; emphasis on t economics of antitrust policy and the impact of government regulato practices. (Academic year)

267 **Seminar: Soviet Economy** (3) Hard

Development of the Soviet-type economy. Organization, policies, a problems: monetary, production, allocative, foreign trade, economi growth. Admission by permission of instructor. (Fall)

268 **Seminar: Economic Theory and Development in Communist Countries** (3) Hard

Appraisal of the Soviet model for economic development in the com munist world, especially in Eastern Europe and China. Admission b permission of instructor. (Spring)

269 **Economy of Communist China I** (3) Yo

Analysis of organization, operation, policies, and problems. Developme of the economy under communism. (Fall)

270 **Economy of Communist China II** (3) Yo

Continuation of Econ 269, examining critical problems of developme Prerequisite: Econ 269 or permission of instructor. (Spring)

271 **Economy of Japan** (3) Hadle

Analysis of Japanese economic institutions and their contribution t Japan's development. (Fall)

*275 **Econometrics I: Introduction** (3) Benne

Single equation models of economic behavior. Statistical methods fo testing economic hypotheses and estimating parameters. Introduction t simultaneous equations problems. Prerequisite: Stat 157–58 or equivalen or permission of instructor. (Fall)

*276 **Econometrics II: Simultaneous Equation Models** (3) Benne

Economic models and simultaneous equations systems. Prerequisite: Ec 275. Recommended: a course in matrix theory. (Spring)

* An interdepartmental course offered by the departments of Economics and Statistics.

281–82 **International Economics** (3–3) Dunn

Econ 281: theory of international trade and factor movements. Econ 282: theory of balance-of-payments adjustment. (Academic year)

285–86 **Economic Development of Latin America** (3–3) Staff

Current policies and programs, capital formation, public and private; foreign loans and investment; social and technological preconditions of investment.

287 **Seminar: Problems in Latin American Civilization** (3) Gordon

Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. Admssion by permission of instructor. (Spring)

298 **Reading and Research** (3)

Limited to Master's degree candidates. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

FOURTH GROUP

Fourth-group Economics courses are limited to graduate students and are primarily for doctoral candidates. They are offered as the demand requires.

312 **Seminar: Price Theory** (3) De Alessi

Discussion of topics of price theory from recent journal articles.

313 **Seminar: Economic Thought** (3) Burns, Hsieh

Continuation of Econ 202. Principal trends in economic thought.

315 **Seminar: Topics in Mathematical Economics** (3) Solomon

Intensive study of selected topics, including economic activity analysis, risk and uncertainty, and other topics of current interest. Prerequisite: Econ 215–16.

321 **Seminar: Monetary Theory** (3) Aschheim

Recent developments in monetary theory.

341 **Seminar: Labor Economics** (3) Staff

Current problems in theory and policy.

363 **Seminar: Public Finance** (3) Staff

Selected topics of current interest.

*378 **Seminar: Topics in Econometrics** (3) Staff

A research seminar covering current econometric literature and special topics. Admission by permission of instructor.

†379–80 **Readings in Economic History** (3–3) Sharkey

Econ 379: American economic history. Econ 380: modern European economic history. Prerequisite: the appropriate second-group preparation and consent of instructor. (Academic year)

*An interdepartmental course offered by the departments of Economics and Statistics.
†An interdepartmental course offered by the departments of Economics and History.

390 **Seminar: International Economic Theory** (3) Staff
Examination of recent contributions in this field.

391 **Seminar: International Economic Policy** (3) Staff
Topics selected from current significant policy problems.

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Education

Professors G.L. Angel, W.T. Carroll, Carol St. Cyr, Mary Ellen Coleman, Daniel Sinick, R.E. Baker, Martha Rashid, Rodney Tillman, Anthony Mariniaccio, L.H. Elliott, Leonard Nadler, Marcella Brenner, J.G. Boswell, C.E. Vontress

Professorial Lecturers J.B. Holden, W.W. Chase, D.D. Darland, Allan Drexler, N.P. Atkins, Norman Drachler, C.J. Kolson, W.J. Mars

Associate Professors Margaret McIntyre, R.J. Frankie, Dorothy Moore, Lawrence Winkler, Donald Linkowski *(Chairman)*

Associate Professorial Lecturers LuVerne Walker, Beverly Heinle, Martha Ware, P.E. Arsenault, K.W. Rollins, David Iwamoto, Samuel Kavruck, John Woodburn, Jean Straub

Assistant Professors Gloria Horrworth, Ruth Peterson, G.D. Wiggs, S.R. Paratore, G.W. Smith, L.O. Bascue, J.A. Kuhagen

Assistant Professorial Lecturers R.J. Kubalak, Shirley McCune, J.D. Gates, Marjorie Daly, Marianne Phelps, Carla Heymsfeld, V.E. Greaver, R.E. McNelis, Agnes Lawless, Sally Boss, Lu Juana Butts, Beverley Burkett, E.C. Dobson, J.H. White, Marvin Mostow

Instructor Nancy Roche

Programs of study leading to the degrees of *Bachelor of Arts in Education, Master of Arts in Education, Master of Arts in Teaching, Education Specialist,* and *Doctor of Education* are offered by the School of Education (see pages 104–30).

SECOND GROUP

Educ 136, 137, 138, 139, 140, 142, 144, and 146 are special methods courses which are to be elected in the senior year by students in the secondary school curriculum after substantial preparation in the teaching fields concerned. Course requirements and hours of credit vary with license requirements. Practices of successful teachers studied; actual teaching content as found in current texts and courses of study reviewed. Prerequisite to all special methods courses: Educ 108, 123, and 131. Additional prerequisites are stated under each course.

108 **Human Development, Learning, and Teaching** (3) Staff
Lecture (2 hours), field work (3 successive hours each week, preferably in the morning, arranged by the Director of Laboratory Experiences)

Principles of effective teaching based on an understanding of human development and the nature of learning. Prerequisite: Psyc 22; Psyc 29 or 112. (Fall and spring)

111 **Elementary School Curriculum and Methods** (15) Moore and Staff

For seniors. Curriculum and methods of teaching in the elementary school: reading, children's literature, mathematics, science, language arts, social studies, music, art, physical education. Pre-student teaching one and one-half days a week. Prerequisite: Educ 108 and 123. (Fall)

112 **Educational Measurement** (3) Staff

Scope, needs, services to students, selection and construction of teacher-made tests, interpretation of tests for evidence purposes. Prerequisite: Educ 108 and 123. (Fall and spring)

113 **Elementary School Art** (3) Heinle

Lecture and laboratory (3 hours), field work—as arranged. For undergraduates in the elementary school curriculum. Materials and methods. Material fee, $5. (Spring)

114 **Elementary School Music** (3) Daly

For undergraduates in the elementary school curriculum. Program of music activities essential to basic musical understanding. Materials and techniques.

*115 **Elementary School Teaching of Reading** (3) Heymsfeld

Introduction to methods, techniques, materials, and activities essential to a good elementary school reading program. Prerequisite: Educ 108 and 123, or teaching experience.

119 **Elementary School Curriculum and Methods** (12) Horrworth and Staff

Limited to M.A.T. students. Curriculum, methods, and materials of reading, language arts, social studies, mathematics, science, music, art, and physical education. Appropriate field experience coordinated during elementary school fall openings. (Fall)

123 **Society and the School** (3) Brenner, St. Cyr, Tillman

Historical and social development of education, contemporary issues, co-operation of the school with other community agencies, functions of school personnel. (Fall and spring)

124 **Communication Skills and Interpersonal Relationships** (3) Brenner

Theory and practice in the development of professional relationships: teacher-child, teacher-parent, teacher-supervisor, utilizing interview and other activities. (Fall and spring)

128 **Children's Literature** (3) Walker, McIntyre

Lecture (2 hours), field work (2 hours). Newer books for children and the children's classics, contribution of literature to child development, children's original expressions. (Spring)

130 **Internship in Elementary Education** (6) Horrworth and Staff

Limited to students in the M.A.T. Program. Full-time teaching in an elementary school under cooperative supervision of the school system and

* This course may not be taken by students who have completed or plan to enroll in Educ 111.

the University staff. Admission by permission of instructor. Prerequisite: Educ 119, 135. (Spring)

131 **Secondary School Principles and Methods** (3) Boswell

For seniors. Classroom management and teaching techniques for initiating, guiding, and evaluating learning activities. Group-work to be arranged. Prerequisite: Educ 108 and 123. (Fall)

132 **Student Teaching in Early Childhood Schools** (6 to 9) McIntyre

For seniors. Admission by permission of instructor. Prerequisite: Educ 111 or equivalent; Educ 152, 153. (Fall and spring)

133 **Supervised Experience in Education** (3 to 6) Staff

Field work, internship, and instructional practice. Educ 133A: adult education and human resource development (Wiggs); Educ 133B: college student development experience (Kirkbride); Educ 133C: higher education (Angel, Frankie). Admission by permission of instructor. (Fall and spring)

134 **Student Teaching in Secondary Schools** (6 to 9) Boswell and Staff

For seniors. Admission by permission of instructor. Prerequisite: Educ 131. (Fall and spring)

135 **Student Teaching in Elementary Schools** (6 to 9) Horrworth, Moore, and Staff

For seniors and for M.A.T. students. Admission by permission of instructor. Prerequisite for seniors: Educ 111 or equivalent. Prerequisite for M.A.T. students: Educ 220. (Seniors—fall and spring; M.A.T. students—fall)

136 **Teaching English in Secondary Schools** (3) McNelis

Lecture (2 hours), field work (2 hours). Prerequisite: 18 semester hours in English. (Spring)

137 **Teaching Speech** (3) Henigan

Lecture (2 hours), field work (2 hours). Prerequisite: 18 semester hours in speech or permission of instructor. (Spring)

138 **Teaching Social Studies in Secondary Schools** (3) Boswell

Lecture (2 hours), field work (2 hours). Prerequisite: 24 semester hours of social studies. (Spring)

139 **Teaching Art in Secondary Schools** (3) Heinle

Lecture (2 hours), laboratory (2 hours). Prerequisite: 24 semester hours of Art. Material fee, $5. (Spring)

140 **Teaching Mathematics in Secondary Schools** (3) Gates

Lecture (2 hours), field work (2 hours). Prerequisite: mathematics through calculus. (Spring)

142 **Teaching Music in Secondary Schools** (3)

Prerequisite: 24 semester hours of Music.

144 **Teaching Science in Secondary Schools** (3) Woodbury

Lecture (2 hours), field work (2 hours). Prerequisite: 24 semester hours of science. (Spring)

146 **Teaching Foreign Languages** (3) Arsenault
Lecture (2 hours), field work (2 hours). Prerequisite: 18 semester hours of one foreign language. (Spring)

150 **Foundations of Early Childhood Education** (3) McIntyre
Admission by permission of instructor. (Fall)

152 **Early Childhood Curriculum** (3) McIntyre
Admission by permission of instructor. (Fall)

153 **Role of the Professional in Early Childhood Education** (3) McIntyre
(*Formerly Early Childhood Classroom Management*)
Admission by permission of instructor. (Spring)

154 **Community Resources and Materials for the Young Child** (3)
Admission by permission of instructor. (Spring)

THIRD GROUP

Departmental prerequisite: A degree from an accredited institution is prerequisite to all third-group courses in Education. Adequate professional preparation is prerequisite to all third-group courses in Education except for those courses limited to students in the M.A.T. Program.

201–2 **Seminar: International Education** (3–3) Moore
For elementary school teachers. Survey of selected foreign educational systems and cultures. Research, techniques, and materials to develop world-mindedness. Embassy resources utilized.

203–4 **Comparative Education** (3–3) Staff
Comparison of United States with foreign educational systems, particularly those of Russia, West Germany, Denmark, Switzerland, France, the British Isles, Canada, and Australia.

205–6 **The Curriculum** (3–3) St. Cyr
For experienced teachers. Educ 205: curriculum foundations and issues, comparison of curriculum patterns. Educ 206: curriculum development in subject areas, group consideration of student problems. (Academic year)

207 **Curriculum Materials** (3 to 6) St. Cyr
For experienced teachers. Construction of courses of study and classroom teaching aids, with direct application to students' situations.

208 **Human Development** (3) Rashid
Contribution of various disciplines to an understanding of human development throughout the life span; emphasis on practical implications of relevant research. (Fall and spring)

209 **Child Development** (3) Rashid
Interdisciplinary approach to child development. Analysis, interpretation, and practical implications for instruction of research in disciplines contributing to a knowledge of child development. (Fall)

210 **Adolescent Development** (3) Rashid
Interdisciplinary approach to adolescent growth and development. Analysis, interpretation, and practical implications for instruction of research in disciplines contributing to a knowledge of the adolescent. (Spring)

212 **Educational Measurement** (3) Staff
Basic measurement techniques; construction, selection, administration, and interpretation of objective and essay-type examinations; statistical analysis of test results; laboratory use of test instruments.

213–14 **History of Education** (3–3) Greaver
Educ 213: European backgrounds of American education. Educ 214: evolution of the American school system. (Academic year)

216 **Education of Slow-learning Children** (3) Staff
Identification, nature, and needs of slow-learning elementary and junior high school children. Emphasis on diagnosis and treatment of learning difficulties.

217–18 **Philosophy of Education** (3–3) Darland
Educ 217: to help students formulate a personal philosophy of education. Educ 218: social foundations of education—forces that shape policies and offerings of the school. (Academic year)

219 **Elementary School Classroom Procedures** (3) Baker
Current theories of teaching and learning and their application to teaching acts and strategies of elementary school teachers.

220 **Elementary School Teaching Foundations** (9) Horrworth and Staff
Limited to M.A.T. students. Introductory block course dealing with the content of professional education courses: history and philosophy of education; educational psychology; human development, learning, and teaching; society and the school; elementary school organization. 160 class hours supplemented by field experience.

223 **Foundations of Reading Instruction** (3) Peterson, Coleman
Historical and psychological background; evaluation of recent methods, materials, and techniques in teaching reading; demonstrations of diagnosis and teaching techniques. (Fall)

224 **Reading Problems** (3) Coleman
Elementary school reading difficulties; classroom and clinical techniques in testing and teaching. Prerequisite: one or more years of recent teaching experience and a previous course in reading or language arts. (Spring)

226 **Reading in Secondary School and College** (3) Coleman
Methods, techniques, and materials necessary for developing efficient reading skills, including skills in content subjects; organizing and evaluating reading programs. (Spring)

227 **Basic Issues in Elementary Education** (3) Baker
Identification, definition, and analysis of some of the most important problems facing the contemporary American elementary school. (Fall)

228 **Instructional Areas in Elementary Education** (3) Baker
Current trends and research on reading, language arts, social studies, mathematics, science, music, art, and physical education. (Spring)

229 **Administration of Elementary Education** (3) Carroll
For experienced teachers and administrators. Achieving instructional objectives, organizing and servicing teaching activities, coordinating school and community life. (Fall)

230 **Intern Seminar for M.A.T. Students** (3) Horrworth
Planning and supervision of individual action research projects. (Spring)

231 **Secondary School Classroom Procedures** (3) Boswell
Current classroom practices: teacher-pupil planning, group procedures, initiatory and culminating activities, individual and group evaluation techniques, teaching aids, etc.; review of recent literature.

232 **Supervision of Elementary Education** (3) Carroll
For experienced teachers and administrators with two or more years of teaching experience. Review of modern supervisory concepts, including practices in the operation of the elementary school. (Spring)

233 **Audio-visual Education** (3) Kubalak
Lecture (2 hours), laboratory (1 hour). Selection, evaluation, and use of audio-visual materials; administrative problems in care, operation, maintenance, and use of such materials and equipment. Material fee, $7. (Spring)

235 **Analysis of Teaching** (3) Boswell
Techniques of analyzing teaching styles and classroom interactions. (Fall)

236 **Introduction to Education Technology** (3) Staff
Consideration of historical perspective, process, instrumentation, and implementation of self-instructional systems. (Fall)

237 **Systems Approach to Instructional Design** (3) Staff
Application of systems techniques to the development of an instructional program. (Spring)

241 **Education of the Gifted** (3) Staff
For classroom teachers. Nature and discovery of giftedness, provisions for the gifted in regular classes, experimental projects.

243 **Human Relations in Education** (3) Marinaccio
Principles and practices in human relations between and among learner, teacher, other school personnel, and parents.

245 **School and Community** (3) Angel
The school as an important member of a team of social agencies that builds the community. (Spring)

246 **Administrative Issues in Urban Education** (3) Drachler
Investigation of current issues in urban education. (Fall and spring)

247 **Adult Occupational Education** (3) Wigg
Development, current concepts, agencies involved, problems, and trend in adult vocational-technical-occupational education in the United State and foreign countries.

249 **Drug Treatment and Resources** (3) Bascue
Individual, social, and cultural factors related to drug abuse. Rehabilitative methods in treating drug abusers; use of community resources.

250 **Counseling Drug Abusers** (3) Bascue
Counseling theory and practice applied to drug abusers. Crisis interven- tion, self-help groups, and family therapy; individual and group counseling

251 **Foundations of Guidance and Personnel Services** (3) Staff
Introductory survey: definitions, scope, principles, historical background organization, services, emerging trends, and issues. (Fall and spring)

252 **Organization and Administration of Guidance Services** (3) Vontress
Procedure and practice in organizing and administering school guidance and pupil personnel programs. Admission by permission of instructor. (Spring)

253 **Analysis of the Individual for Purposes of Counseling** (3) Winkler
Detailed study of individual analysis and appraisal techniques. Develop- ment of systematic case study. Prerequisite: Educ 112 or equivalent. (Fall and spring)

254 **The Middle School** (3) Atkins
Purposes, organization, core program, guidance, developing course of study, extra-classroom activities. (Fall)

255–56 **Secondary Education** (3–3) Staff
Educ 255: current proposals for improvement of secondary education. Educ 256: current problems in each subject-matter field. (Academic year)

257 **Educational and Occupational Development** (3) Sinick, Vontress
Theories of career development; factors influencing the world of work; procedures for evaluating and using socio-personal, educational, and oc- cupational information. (Fall and spring)

258 **Techniques of Counseling** (3) Vontress
Theories and practices of vocational, educational, and personal counseling. Prerequisite: 12 semester hours in guidance and counseling, including Educ 253 and 257. (Fall and spring)

259 **Secondary School Administration** (3) Marinaccio
For experienced teachers and administrators. Survey of administration, in- cluding practices of the modern high school. (Fall)

260 **Secondary School Supervision** (3) Marinaccio
For experienced teachers and administrators. Review of modern super- visory concepts, including practices in schools. (Spring)

261 **Practicum in Guidance** (3 to 6) Vontress and Staff

Supervised experience in counseling and guidance. Prerequisite: 12 semester hours in counseling and guidance. Admission by permission of Department Chairman. (Fall and spring)

263 **Human Resource Development: Training and Education** (3) Wiggs

Concepts and purpose, historical backgrounds, emerging roles of human resource development personnel, program areas. Prerequisite: adequate professional preparation or experience in training, education, and development. (Fall)

264 **Program Planning in Human Resource Development** (3) Nadler

Training, education, and development programs for various client systems will be planned using critical events conceptual model. Field work. Prerequisite: Educ 263 and permission of instructor. (Spring)

269–70 **School Business Management** (3–3) Marinaccio

Educ 269: philosophy, responsibilities, and functions of the business management office in public education institutions. Educ 270: practicum in educational business management. (Academic year)

271 **The Teacher and School Administration** (3) Carroll, Marinaccio

Role of federal, state, and local administrative units; school finance; legal controls; school plant; public support; improving teaching conditions. (Fall and spring)

272 **The Teacher and School Supervision** (3) Carroll, Marinaccio

Nature, organization, human relationships, and techniques. (Fall and spring)

273–74 **Teacher Education** (3–3) Boswell

Educ 273: aims, objectives, and basic issues; study of outstanding and experimental programs. Educ 274: recruitment and selection, general education, teaching-field preparation, professional sequences, laboratory experiences. (Academic year)

275 **Seminar: School Finance** (3) Carroll

Educational financial theory, practice, and control, including methods of financing. (Fall)

276 **Seminar: Public Relations in School Administration** (3) Carroll

Purposes, gathering materials, disseminating agencies, publicity media, public participation in policy-making. (Spring)

278 **School Law** (3) Ware

Sources and scope of school law; legal rights and responsibilities of teachers, pupils, and taxpayers. Other legal problems of major interest to the group. (Spring)

279 **Adult Education** (3) Nadler

Current concepts and objectives, historical development, agencies involved, personnel, clients, programs on all levels—community through international. (Fall)

280 **Program Planning in Adult Education** (3) Wigg

Determining educational needs for adults at all levels in school and no school agencies; planning programs and instruction; budgeting and schedu uling of adult programs. Field work with actual sponsoring agency. Pre requisite: Educ 279 and permission of instructor. (Spring)

283 **Higher Education in the United States** (3) Ange

Development, scope, purpose, present status, programs, and trends o higher education in the United States. (Fall)

284 **Administration of Higher Education** (3) Angel, Elliott, and Staf

Government, organization, and administration of colleges and univers ties; duties of trustees and administrators. (Fall and spring)

285 **Student Activities** (3) Ange

Nature and purposes of selected activities—homeroom, clubs, assemblie school publications, student council, interscholastic contest; attention t sponsorship, participation, finance, and evaluation.

287–88 **Clinical Study of Reading Problems** (3–3) Coleman, Peterso

For advanced students. Diagnostic and corrective work under supervisio in the Reading Center. Prerequisite: Educ 223 and 224 or 226, or equiv alent. Material fee, $10 a semester. (Academic year)

289 **Supervisory Problems in Reading** (3) Kobo

For experienced teachers, principals, supervisors, and superintendent Problems in planning, reorganizing, and improving the total reading pro gram. (Fall)

290 **Diagnosis and Instruction—Severe Reading Problems** (3) Kobo

For experienced teachers. Case studies of children and/or adults wh severe reading problems, planning and implementing instructional pro grams. Admission by permission of instructor. Material fee, $10. (Spring)

291 **Planning the School Plant** (3) Chi

Selection of sites; evaluation of existing buildings; utilization of presen facilities; adaptation to curricular needs; building, operation, and maint nance problems. (Fall)

293–94 **Research and Independent Study** (3–3) St

Individual research under guidance of a staff member. Program and co ferences arranged with an instructor. (Academic year)

295 **Research Methods and Procedures** (3) St

Required of all candidates for graduate degrees in Education. To b taken early in the graduate program. (Fall and spring)

296 **Seminar: Educational Research** (3) St

Analysis of scientific approaches to problems in education and evaluatio of the application of research techniques. Required of all candidates f the Ed.D. degree. Prerequisite: Educ 295 and Stat 105; or equivalent. (Fall and spring)

297 **Personnel Administration** (3) Carroll

Organization and administration of personnel programs for educational institutions. Basic philosophy, principles, responsibilities, and functions.

298 **Seminar: Personnel Administration** (3) Carroll

Research: policies, rules and regulations, staff organizations, negotiations.

299–300 **Thesis Research** (3–3) Staff

Required of Master of Arts in Education candidates writing Master's theses. (Fall and spring)

301 **Data Processing in Education** (3) McCarthy

Machine accounting and computer technology for counselors, teachers, and administrators.

303 **Data Analysis** (3) Linkowski

Use of computer in data analysis. For doctoral students at the dissertation-planning stage. (Fall)

304 **Practicum in Supervision** (3 to 6) Marinaccio

Supervised practical experience in supervision of instruction. Admission by permission of instructor.

305 **Internship: Supervision** (3 to 6) Marinaccio

Service in a school situation directed by the University and school systems to integrate theory and practice.

316 **Curriculum Developments in Elementary School Social Studies** (3 to 6) Moore

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school social studies curriculum. Admission by permission of instructor.

317 **Curriculum Developments in Elementary School Science** (3 to 6) St. Cyr

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school science curriculum. Admission by permission of instructor.

320 **Curriculum Developments in Elementary School Mathematics** (3 to 6) St. Cyr

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school mathematics curriculum. Admission by permission of instructor. (Spring)

321 **Practicum in Curriculum** (3 to 6) St. Cyr

Supervised field experience in curriculum. Admission by permission of instructor. (Fall and spring)

330 **Foundations of Early Childhood Education** (3) McIntyre

Historical developments, philosophy and objectives of nursery schools, kindergartens and day care centers, exploration of contemporary programs and models with curriculum implications. (Fall)

332 **Early Childhood Curriculum** (3) McIntyre

Content, approaches, methods, and materials in language arts, mathematics, science, health, social studies, and creative arts. (Fall)

333 **Role of the Professional in Early Childhood Education** (3) McIntyre

(*Formerly Early Childhood Classroom Management*)

Planning, reporting, records, teacher-child and teacher-family interaction, diagnosis and evaluations, working with paraprofessionals. (Spring)

334 **Community Resources and Materials for the Young Child** (3)

Interaction with community for services and resources; physical facilities including play activities and materials for the young child. (Spring)

335 **Practicum in Early Childhood Education** (3 to 6) McIntyre

Supervised professional activity in selected early childhood programs; seminar. Prerequisite: 12 semester hours in early childhood education and permission of instructor. (Fall and spring)

336 **Practicum in Reading** (3) Coleman, Peterson, and Staff

Supervised experience in testing and teaching in the Reading Center. Approximately 120 class hours required. Laboratory fee, $10. Admission by permission of instructor. (Fall and spring)

341 **Cognitive Models and Instructions** (3) Rashid

Cognitive models (Guilford, Piaget, etc.) are analyzed as the theoretical basis for planning instructional episodes appropriate at various levels—childhood through young adulthood. (Fall)

342 **Language Development** (3) Rashid

Nature of language development; role of language in the socialization process. (Spring)

354 **Counseling of Minority Groups** (3) Vontress

Consideration of problems and approaches related to counseling cultural and racial minorities in American society; emphasis on counseling the disadvantaged in urban areas.

355 **Counseling in Groups** (3) Rollin

Principles of group dynamics as related to interaction within groups. Techniques and practice in group counseling. (Fall)

356 **Seminar: Guidance and the Disciplines** (3) Staff

For experienced counselors. Exploring the foundations of guidance through the disciplines of psychology, sociology, economics, anthropology, and philosophy.

357 **Mental Hygiene** (3) Winkler

Mental health problems; emphasis on needs of counselors, teachers, and others working with children and adolescents. (Fall and spring)

361 **Medical Aspects of Rehabilitation Counseling** (3) Sing

Etiology, symptomatology, and treatment of chronic and traumatic disorders with rehabilitation counseling implications. Admission by permission of instructor. (Fall)

362 **Client Evaluation in Rehabilitation Counseling** (3) Sinick

Test and nontest methods of furthering client and counselor understanding. Prerequisite: Psyc 131. (Spring)

363 **Psychosocial Aspects of Rehabilitation Counseling** (3) Linkowski

Impact of congenital and later disabilities on attitudes, self concepts, and motivations. Implications for rehabilitation counseling. Admission by permission of instructor. (Fall)

364 **Middle-management in Rehabilitation** (3) Kuhagen

Technical and interpersonal aspects of supervisory and other management responsibilities related to professional support personnel. Theory and practice in case management and staff development. Case study and role playing.

365–66 **Field Work in Rehabilitation Counseling** (3–3) Bascue, Kuhagen, Sinick

Field work of one full day a week. Educ 365: concurrent seminar covering history, philosophy, and introduction to practice. Educ 366: concurrent seminar covering job analysis, placement, and follow-up. Admission by permission of instructor. (Academic year)

367–68 **Internship: Rehabilitation Counseling** (6–6) Kuhagen, Linkowski

Supervised practice of three full days a week, with seminar providing integration of theory and practice. Prerequisite: Educ 365–66. (Academic year)

369 **Professional Issues in Rehabilitation Counseling** (3) Bascue

Culminating seminar covering professional problems and ethical issues. Prerequisite: Educ 367. (Spring)

370 **College Students and Their Community** (3) Straub

Survey of literature on the characteristics, behavior, and attitudes of the contemporary college student; college student interaction with his environment. Admission by permission of instructor. (Fall)

371 **Introduction to College Teaching** (3) Frankie

General principles, methods, techniques, and experimental instructional media for teaching at the college and university level. (Fall)

372 **Internship in College Teaching** (3 to 6) Frankie

Supervised experience in a selected area of college teaching. Prerequisite: Educ 371. Admission by permission of instructor. (Spring)

373 **The Junior-Community College** (3) Angel, Frankie

The two-year college as it relates to secondary education, four-year colleges, and universities. Objectives, curricula, students, faculty, legal concerns, and special problems of two-year colleges. (Fall)

374 **Current Issues in Higher Education** (3) Elliott, Angel

Prerequisite: Educ 283, 284. (Spring)

375 **Foundations of a College Student Development Program** (3) Kirkbride

College student development as an integral part of higher education programs. (Fall)

376 **College Student Development and Campus Groups** (3) Kirkbr
Principles and procedures of student development programs with cam
groups; campus group activities and development of student leaders
(Spring)

377 **Practicum in College Student Development** (3 to 6) Kirkbride, Phe
Supervised practical experience in college student development progra
Admission by permission of instructor. (Fall and spring)

378 **Practicum in Teacher Education** (3 to 6) Brenner, Bosw
For selected experienced teachers. Supervised field work relevant to s
dent's professional needs, to be arranged. (Fall and spring)

379 **Practicum in Adult Education** (3 to 6) Nadl
Supervised practical experience in various forms of adult education a
human resource development. Admission by permission of instruct
(Fall and spring)

380 **Sensitivity Training: Laboratory Method** (3) Drexler, McCu
A sensitivity learning experience in human relations using unstructure
group experience, individual feedback, experimentation, and practic
Admission by permission of Department, prior to registration. (Fa
and spring)

381 **The Adult as a Learner** (3) Angel, Wigg
Psychology of learning as applied to adults; effect of age on learnin
physical and social environment in adult education situations. (Fa

382 **Methods in Adult Education** (3) Nadler, Wigg
Methods, techniques, and devices in adult education; traditional method
developing action-oriented learning situations, programmed instructio
and systems approach in developing training programs. (Spring)

383 **Counseling of Adults** (3) Wigg
Theories and practical applications of occupational counseling, empha
sizing distinct needs of adults and young adults; primarily intended fo
counselors in military, government, business, and industrial organizations
(Spring)

384 **Evaluation of Adult Education** (3) McCu
Measurement and evaluation of adult education in school and nonschool
agencies—business, industry, government, voluntary organizations, and
community. (Spring)

385 **Collective Negotiations in Higher Education** (3) St
Theory, practice, problems, and issues in collective negotiations in high
education.

386 **Current Issues in Adult Education** (3) Wiggs, Hold
(Spring)

387 **Administration of Adult Education** (3) Nadl
Program administration, staff recruitment and development, fiscal oper
tions, facilities, and maintenance of effective community relations.
(Spring)

388 **Case Studies in Higher Education Administration** (3) Angel

Analysis of selected hypothetical cases related to essential administrative functions of colleges and universities. Limited to advanced doctoral candidates. Admission by permission of instructor.

389 **Consultant-Client Relationship in Human Resource Development** (3) Nadler

(Fall)

390 **Legal Problems in Higher Education** (3) Frankie

Investigation of legal problems in higher education related to administration, students, faculty, and academic program. (Spring)

391 **College and University Curriculum** (3) Frankie

Development, patterns, creative design, issues, problems, evaluation, and trends in the higher education curriculum. (Fall)

392 **Financing Higher Education** (3) Frankie

Analysis of private, state, and federal revenue sources; student aid, program budgets, and financial methods and practices. (Spring)

393 **Practicum in Higher Education** (3 to 6) Angel

Supervised field experiences in higher education; reports and conferences. Admission by permission of instructor. (Fall)

394 **College and University Governance** (3) Marinaccio

Organizational and administrative structures, patterns, and relationships in higher education. Prerequisite: Educ 284. (Fall)

395 **Problems and Practices in School Administrative Organization** (3 to 6) Marinaccio

Application of principles and practices concerned with change and evaluation of educational administration.

396 **Internship: Higher Education Administration** (3 to 6) Marinaccio

Service in a higher education situation directed by the University and the cooperating institution to integrate theory and practice. (Fall and spring)

397 **Internship: Elementary Administration** (3 to 6) Carroll

Service in a school situation directed by the University and school system to integrate theory and practice. (Fall and spring)

398 **Internship: Secondary Administration** (3 to 6) Marinaccio

Service in a school situation directed by the University and school system to integrate theory and practice. (Fall and spring)

399 **Seminar: Applied Educational Administration** (3 to 6) Carroll

Application of the theories and principles of administration to the public schools. Student participation with guidance by recognized regional practitioners.

400 **Special Workshop in Education** (arr.)

Topics to be announced in *Schedule of Classes*. May be repeated for credit.

FOURTH GROUP

A Master's degree from an accredited institution is prerequisite to all fourth-g courses. All fourth-group seminars are open to doctoral candidates or other Master's degree students with approval of instructor. Study is individually pla on the basis of previous study and experience in the subject field to attain an adva level of competence and meet identified professional needs or field requirements.

Each of the following courses is offered fall and spring. Each course may be peated for credit.

401 **Seminar: History of Education** (arr.) Grea

403 **Seminar: Philosophy of Education** (arr.) Darl

405 **Seminar: Human Growth and Development** (arr.) Ras

411 **Seminar: Elementary Education** (arr.) Bak

413 **Seminar: Secondary Education** (arr.)

421 **Seminar: Adult Education** (arr.) Wiggs, Nad

422 **Seminar: Higher Education Administration** (arr.) Marinaccio, Ang

423 **Seminar: Higher Education** (arr.) Ang

424 **Seminar: College Student Development** (arr.) Kirkbri

425 **Seminar: Teacher Education** (arr.) Boswell, Bake

427 **Seminar: Human Resource Development** (arr.) Wiggs, Nadle

429 **Seminar: Educational Personnel Administration** (arr.) Carro

431 **Seminar: Administration** (arr.) Carroll, Marinaccio

433 **Seminar: Supervision** (arr.) Carroll, Marinaccio

434 **Seminar: Elementary Supervision** (arr.) Carro

435 **Seminar: Elementary Administration** (arr.) Carro

436 **Seminar: Secondary Supervision** (arr.) Marinaccio

437 **Seminar: Secondary Administration** (arr.) Marinaccio

441 **Seminar: Curriculum** (arr.) St. Cy

443 **Seminar: Guidance and Counseling** (arr.) Vontress

445 **Seminar: Research and Evaluation** (arr.) Rashid, Linkowski

490 **Dissertation Seminar** (3) Staff
Required of all Ed.D. degree candidates. Approval of the dissertation prospectus is necessary for successful completion of the seminar.

491 **Dissertation Research** (arr.) Staff
Preparation of a research outline; research and writing of an approved doctoral dissertation under the direction of major adviser and dissertation committee. Prerequisite: Educ 490.

English

Professors C.D. Linton, C.W. Cole, R.H. Moore, J.H. Coberly, P.H. Highfill, Jr., J.G. Allee, Jr., J.P. Reesing, Jr., Milton Crane, E.R. Weismiller, R.N. Ganz, Jr., G.E. McCandlish (*Chairman*)
Adjunct Professor J.C. Broderick
Associate Professors W.L. Turner, Muriel McClanahan, A.E. Claeyssens, Jr., R.C. Rutledge, J.A. Quitslund
Assistant Professors Judith Plotz, T.M. Scanlan, C.W. Sten, G.R. Bozzini, Agnes Cannon, R.L. Combs
Adjunct Assistant Professors Barbara Dunham, Fredrica Rosenberg
Instructors Judith Carlberg, Judith Lefkowitz, J.J. O'Connell, Jr., Anne Richardson
Lecturers Edgar Boling, Jr., Elna Broffman, Monica Finkel, Catherine Bahl, Ann Romines, A.L. France, Caroline MacMullan, Faye Moskowitz

Bachelor of Arts with a major in American Literature or *English Literature (Field-of-Study or Departmental).*—The following requirements must be fulfilled:
1. The general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)
2. Prerequisite courses—Engl 51–52 or 71–72 or 91–92.
3. Required courses in related areas—(a) 12 semester hours of a foreign language (Classical Hebrew, Greek, Latin, French, German, Italian, Russian, or Spanish), or equivalent; (b) 6 semester hours of Philosophy and/or Religion; (c) 6 semester hours of History (English, American, European, or World).
4. Required for the major:
(a) *Field-of-Study major*—the passing of the major examination in either American or English Literature at the end of the senior year. No set pattern of courses is prescribed. The student is expected to engage himself more or less systematically with writers and works from the whole chronological span of American literature or English literature. The field-of-study major offers an opportunity during the student's senior year for work in special seminars, and, for honors candidates, independent study. A Proseminar in American Literature, Engl 199–200, and a Senior Seminar in English Literature, Engl 159 and/or 160, assist students in their preparation for the major examination. *Students who wish to be candidates for graduation with Special Honors in either American or English Literature must be in the field-of-study major.*
(b) *Departmental major*—30 semester hours of second-group courses offering experience with several approaches to literature which, together, make a discipline of literary study—practical criticism, history of literature, literary period(s), genre(s), and major author(s)—distributed as follows:
American Literature majors—24 semester hours of American Literature courses, including Engl 161–62; 6 hours of English Literature courses.
English Literature majors—15 semester hours of English Literature courses, including Engl 121, 122, a 3-hour course on a literary period, a 3-hour course on a genre, and a 3-hour course on a major author; 3 semester hours of American Literature; and 12 additional hours of courses offered by the Department of English of which at least 9 hours must be in English Literature.

Master of Arts in the field of American Literature.—Prerequisite: the degree of Bachelor of Arts with an undergraduate major in English, or 24 semester hours in English and/or American literature above the sophomore level.

Required: the general requirements, pages 92–99, including (1) 24 semester ho of course work planned in consultation with the adviser on the basis of the s dent's undergraduate preparation, including a minimum of 6 semester hours English literature; (2) a written Master's Comprehensive Examination; (3) a M ter's thesis (6 semester hours) written on an approved topic under the directi of the instructor in whose field the major portion of the material falls, or, with t approval of the Department adviser, 12 additional semester hours in lieu of thes

Master of Arts in the field of English Literature.—Prerequisite: the degree Bachelor of Arts with an undergraduate major in English or American Literature, 24 semester hours in English and/or American literature above the sophomore leve

Required: the general requirements, pages 92–99, including (1) 24 semester hour of course work, planned in consultation with the adviser; (2) a written Master's Com prehensive Examination; and (3) a Master's thesis (6 semester hours) written o an approved topic under the direction of the instructor in whose field the materia falls, or, with the approval of the Department adviser, 12 additional semester hours in lieu of thesis.

Doctor of Philosophy in the field of American Literature.—Required: the genera requirements, pages 92–96, 99–101; high-level proficiency in an appropriate foreign language; the passing of a General Examination in four of the six following fields one of which must be English Literature: (1) Early American Literature—to 181 (2) American Fiction, (3) American Poetry, (4) American Romanticism, (5) American Realism, (6) English Literature—one of the first seven fields listed belo under "Doctor of Philosophy in the field of English Literature." Each student plans his program in consultation with a departmental committee.

Doctor of Philosophy in the field of English Literature.—Required: the genera requirements, pages 92–96, 99–101; high-level proficiency in an appropriate foreign language; the passing of a General Examination in four of the eight following fields (1) Beginnings to 1500, Linguistics, and History of the Language; (2) 1500–166 (3) 1660–1800; (4) 1800–1900; (5) 1900 to Present; (6) Drama, including Shake speare; (7) Criticism; (8) American Literature—one of the first five fields listed above under "Doctor of Philosophy in the field of American Literature." Each student plans his program in consultation with a departmental committee.

Bachelor of Arts in Education with a teaching field in English.—Prerequisite: the Education curriculum, page 78.

Required: the English option and the professional courses listed on pages 112, 11

Students whose College Board English Composition Achievement Test scores sug gest inadequate preparation may be assigned to Engl 1*x* or may be tested in vo cabulary, spelling, grammar, standard usage, and writing skill, before placement in either Engl 1*x* or 1. Students whose scores and/or writing skill indicate superior competence will be allowed to waive Engl 1; those whose scores indicate markedly superior competence will be allowed to waive both Engl 1 and Engl 2 or 4.

Departmental prerequisite: Engl 1 or 1*x* is prerequisite to all other courses in English. A 6-semester-hour course in literature, or equivalent, or written permission of the instructor, is prerequisite for admission to all second-group courses in English except Engl 115 and 161–62.

ENGLISH COMPOSITION

FIRST GROUP

A English for Foreign Students (3) Bozzi

Reading and writing to assist the foreign student in overcoming deficie

cies in the use of English. Special attention to spelling, syntax, grammar, idiom, and vocabulary. (Fall and spring)

B English for Foreign Students (3) Bozzini

For second-semester foreign students not ready for Engl 1. Writing of expository paragraphs and themes; outlining; reading for comprehension, vocabulary, and style. (Fall and spring)

1 English Composition: Language as Communication (3) Moore and Staff

Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence, by analysis of selected current prose; library research procedure. (Fall and spring)

1*x* English Composition: Language as Communication (3) Moore and Staff

Intensive course in English grammar and composition for students inadequately prepared for Engl 1. Begins with detailed instruction, drill, and exercises in basic structure of the English language and in writing paragraphs; continues with content of Engl 1. Engl 1*x* meets five hours a week and carries 3 semester hours of credit. Total fee, $283 (tuition of $258 plus additional fee of $25). (Fall and spring)

2 English Composition: Language and the Arts and Sciences (3) Moore and Staff

Study and practice of expository and argumentative techniques; emphasis on the rhetorical complexities of the sentence and of diction, and on logical thought, by analysis of selected books on the nature of language and of the arts and sciences. Prerequisite: Engl 1 or 1*x*. Students who receive credit for Engl 2 cannot receive credit for Engl 4. (Fall and spring)

4 English Composition: Language in Literature (3) Moore and Staff

Study and practice of expository and argumentative techniques through critical writing; emphasis on the rhetorical complexities of stylistics in the sentence and in diction, and on logical thought, by the study of literary genres and of the use of language in literature. Prerequisite: Engl 1 or 1*x*. Students who receive credit for Engl 4 cannot receive credit for Engl 2. (Fall and spring)

ECOND GROUP

101 Expository Writing (3) McClanahan, Moore

Types of expository writing; weekly exercises based on students' needs; particular attention may be given to problems in the writing of graduate theses. Prerequisite: Engl 1 or 1*x*; 2 or 4. (Fall)

102 Narrative Writing (3) Weismiller, Claeyssens

Techniques of narrative writing; class criticism of student writing. Prerequisite: Engl 1 or 1*x*; 2 or 4; consent of instructor. To apply for the instructor's consent a student should, before registration, submit samples of his writing. (Fall and spring)

103 **The Writing of Fiction—the Short Story** (3) Claeyssens

Prerequisite: Engl 102, consent of instructor. To apply for the instructor's consent a student should, before registration, submit a sample of his writing. (Fall)

105–6 **The Writing of Plays** (3–3) Claeyssens

Prerequisite: Engl 1 or 1*x*; 2 or 4; consent of instructor. To apply for the instructor's consent a student should, before registration, submit a sample of his writing. (Academic year)

107 **The Writing of Fiction—the Novel** (3) Claeyssens

Prerequisite: Engl 102 or 103, consent of instructor. To apply for the instructor's consent a student should, before registration, submit a sample of his writing.

108 **Advanced Writing—Poetry and Prose** (3) Weismiller

Prerequisite: Engl 1 or 1*x*; 2 or 4; consent of instructor. To apply for the instructor's consent a student should, before registration, submit a sample of his writing. (Spring)

ENGLISH LITERATURE

FIRST GROUP

51–52 **Introduction to English Literature** (3–3) Quitslund and Staff

Historical survey. (Academic year)

91–92 **Introduction to European Literature** (3–3) Crane and Staff

Consideration of various types. (Academic year)

SECOND GROUP

111 **Medieval English Literature—Exclusive of Chaucer** (3) Allen

112 **Chaucer** (3) Allen

(Spring)

115 **Introduction to English Linguistics** (3) Allen

Development of the English language in a historical treatment of English grammar. (Fall)

116 **Medieval Legend and Saga** (3) Allen

Celtic and Norse.

117–18 **English Poetry: Form and Content** (3–3) Weismiller

Medieval period to the 20th century. (Academic year)

121 **Practical Criticism** (3) Weismiller

(Fall)

122 **History of English Literature** (3) Reesing

(Spring)

123 **Principles of Literary Criticism** (3)

125–26 **Elizabethan Verse and Prose** (3–3) Quitslund
Engl 125: survey of nondramatic literature. Engl 126: detailed study of major writers and genres.

127–28 **Shakespeare** (3–3) Highfill, Crane
(Academic year)

129 **The Earlier 17th Century** (3) Reesing
Poetry and prose to 1660, exclusive of Milton. (Fall)

130 **Milton** (3) Reesing
(Spring)

131–32 **English Literature, 1660–1780** (3–3) Highfill
Poetry and prose of the Neoclassic period. Engl 131: 1660–1740. Engl 132: 1740–1780. (Academic year)

133–34 **The Romantic Movement** (3–3) Plotz
Engl 133: survey of poetry and prose, 1780–1830. Engl 134: detailed study of major writers and genres. (Academic year)

135–36 **Victorian Literature** (3–3) Plotz
Engl 135: survey of poetry and prose, 1830–1900. Engl 136: detailed study of major writers and genres. (Academic year)

137–38 **The 20th Century** (3–3) Linton
Literature since 1900. Engl 137: poetry and criticism. Engl 138: drama and the novel. (Academic year)

151 **19th Century British Poetry** (3)
Readings in Wordsworth, Keats, Browning, and Swinburne.

153–54 **The English Novel** (3–3)
Major novelists. Engl 153: 18th century. Engl 154: 19th century.

155–56 **The English Drama** (3–3) Crane
Engl 155: principally the drama of Shakespeare's contemporaries. Engl 156: historical survey, 1660 to present.

157 **20th Century Drama** (3)
Representative continental, English, and American plays of the 20th century.

158 **20th Century British Prose Fiction** (3)

159–60 **Senior Seminar in English Literature** (3–3) Reesing, Crane
Engl 159: history as literature—study of English historical writers from Bede to Churchill. Engl 160: Shaw—a selection of the major plays and nondramatic writings. (Academic year)

197 **Independent Study** (3) Weismiller and Staff
Open to honors candidates in the field-of-study major during their senior year. (Fall and spring)

198 **Senior Honors Thesis** (3) Weismiller and Staff
An independent-study course in which, under the guidance of an instructor, the student writes a thesis on an approved topic. Open to qualified seniors in the field-of-study major in English Literature. (Fall and spring)

THIRD GROUP

212 **Studies in Chaucer** (3) Allen

213 **Old English** (3) Allen
Old English grammar and readings.

214 **Beowulf** (3) Allen
Prerequisite: Engl 213 or equivalent.

217 **English Poetry: the Formal Development** (3) Weismiller
(Spring)

218 **Form and Content in Modern Poetry** (3) Weismiller

219 **Research Methods and Bibliographical Materials** (3) Broderick
To acquaint graduate students with the principal sources of bibliography and the typical problems in research. (Fall)

220 **Studies in Modern Dramatic Literature** (3) Craig

221 **Studies in Comic Literature** (3) Craig

223–24 **Studies in Literary Criticism** (3–3) Plotz
(Engl 224: spring)

225–26 **Studies in 16th Century English Literature** (3–3) Quitslund
(Engl 225: fall)

227–28 **Studies in Shakespeare and His Contemporaries** (3–3) Craig
(Academic year)

229 **Studies in English Literature, 1600–1660** (3) Reesing
Chief figures exclusive of Milton. (Fall)

230 **Studies in Milton** (3) Reesing
(Spring)

231–32 **Studies in English Literature, 1660–1780** (3–3) Highfill

233–34 **Studies in the Romantic Movement** (3–3) Plotz
(Engl 233: fall)

235–36 **Studies in Victorian Literature** (3–3) Linton

237–38 **Studies in 20th Century Literature** (3–3) Linton

242 **Renaissance Intellectual History** (3)
Offered in collaboration with the Folger Shakespeare Library Institute of Renaissance and 18th Century Studies.

253–54 **Seminar: the English Novel** (3–3) Coberly

255–56 **Studies in Dramatic and Theatrical History** (3–3) Highfill
Engl 256: seminar in drama and theatre of the Restoration and 18th Century, held among the Folger Library collections.

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

AMERICAN LITERATURE

FIRST GROUP

71–72 **Introduction to American Literature** (3–3) Cole and Staff
Historical survey. Engl 71: from beginnings to the Civil War. Engl 72: from the Civil War to present. (Academic year)

SECOND GROUP

161–62 **Studies in American Literature** (3–3) Sten
Same as AmCv 161–62. Major factors in the national cultural tradition as shown by outstanding writers. Prerequisite: Engl 51–52 or 71–72. (Academic year)

163–64 **Major American Poets** (3–3) Ganz
Advanced critical study of significant writers and movements. Engl 163: from beginnings through the 19th century. Engl 164: the 20th century. (Academic year)

165–66 **American Drama** (3–3) Cole, Scanlan
Historical and critical study of significant plays and forms. Engl 165: from beginnings to 1930. Engl 166: since 1930. (Academic year)

167–68 **The American Novel** (3–3) Coberly
Historical and critical study of significant novels. Engl 167: from beginnings through the 19th century. Engl 168: 20th century. (Academic year)

170 **The American Short Story** (3) Coberly
Historical development of the short story in America.

171–72 **Major American Writers** (3–3) Combs, Ganz

Engl 171: Hart Crane and Wallace Stevens—modern Romanticism. Engl 172: Whitman, Frost, Henry Miller, and William Carlos Williams. (Academic year)

173–74 **Selected Literary Movements** (3–3)

175–76 **Special Topics in American Literature** (3–3)

Topic for 1973–74: autobiography as literature. A broad survey on the varieties of autobiographical work in American literature, from Colonial times to the present. (Academic year)

177–78 **Contemporary American Literature** (3–3) Ganz, Claeyssens

(Academic year)

197 **Independent Study** (3) Weismiller and Staff

Open to honors candidates in the field-of-study major during their senior year. (Fall and spring)

198 **Senior Honors Thesis** (3) Weismiller and Staff

An independent-study course in which, under the guidance of an instructor, the student writes a thesis on an approved topic. Open to qualified seniors in the field-of-study major in American Literature. (Fall and spring)

199–200 **Proseminar in American Literature** (3–3) Scanlan and Staff

For field-of-study majors in American Literature. Readings, conferences and group discussions. (Academic year)

THIRD GROUP

219 **Research Methods and Bibliographical Materials** (3) Broderick

To acquaint graduate students with the principal sources of bibliography and the typical problems in research. (Fall)

263–64 **Studies in American Poetry** (3–3) Ganz

(Academic year)

267–68 **Seminar: American Fiction** (3–3) Cobert

Research and critical reading: fiction and the criticism of fiction. (Academic year)

270 **Seminar: the American Short Story** (3) Cobert

281–82 **Seminar: Early American Literature** (3–3) McCandliss

Same as AmCv 281–82. (Academic year)

283–84 **Studies in American Transcendentalism** (3–3) Broderick

(Engl 284: Melville's early fiction—spring)

285–86 **Seminar: American Literature, 1865–1900** (3–3) McCandliss

Realism in America.

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

FOURTH GROUP

367–68 **Readings in American Fiction** (3–3) Coberly

For graduate students only. Literature and the critical materials for which graduate students are responsible on the Doctor of Philosophy general examination.

381–82 **Readings in Early American Literature** (3–3) McCandlish

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Environmental Studies

COMMITTEE ON ENVIRONMENTAL STUDIES

Henry Merchant *(Chairman)*, Otto Bergmann, S.W. Burks, R.S. French, R.W. Kenny, T.P.G. Liverman, W.E. Schmidt

Columbian College of Arts and Sciences offers interdepartmental programs n Environmental Studies leading to the degree of Bachelor of Arts or Bachelor of Science. The program leading to the degree of Bachelor of Arts is designed or the student whose orientation is essentially political or social and who expects to enter law, politics, urban planning, or other areas for the purpose of altering society's responses to environmental problems. The program leading o the degree of Bachelor of Science is designed for the student with well deeloped interests in science who seeks professional identification as a field or aboratory worker in the environmental sciences.

Bachelor of Arts with a major in Environmental Studies (Departmental).—The fol-owing requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87.
2. Prerequisite courses (qualified students may substitute advanced courses with epartmental permission, in order to include more elective courses in their program):
   (a) Mathematics and/or Statistics—9 semester hours selected from Math 31, 2, 51, 52, 111; Stat 91, 97, 113, 118, 198.
   (b) Natural Sciences—6 to 8 semester hours selected from B Sc 11-12; Chem 1–12; Geog 1–2; or Phys 1, 2.
   (c) Social Studies—12 semester hours selected from Anth 1-2; Econ 1-2; eog 51, 52; P Sc 4 or 5, 6; Psyc 1, 5–6; or Soc 1, 2.
3. Required courses in the major (48 semester hours):
   (a) B Sc 140 (4 semester hours).
   (b) 8 semester hours selected from B Sc 111, 115, 118, 123, 124, 167 (Biolgy); B Sc 109, 110 (Botany); B Sc 101, 102, 140, 143, 144 (Zoology); Chem 50, 51-52, 156; Geol 5, 125, 147, 163, 172, 181; Phys 6, 31, 32, 40, 41, 42, 51, 52.
   (c) 30 semester hours in courses selected from *two* departments in the following—Anth 151, 152, 170; Econ 101, 102, 136, 157; Geog 127, 132, 133, 140, 42, 144, 145; P Sc 103, 104, 108, 146; Psyc 151, 156; Soc 126, 127, 128.

(d) Envr 151–52 (6 semester hours).

Bachelor of Science with a major in Environmental Studies (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87.
2. Prerequisite courses (qualified students may substitute advanced courses with departmental permission, in order to include more elective courses in their program):

(a) Mathematics and/or Statistics—9 semester hours selected from Math 31, 32, 51, 52, 111; Stat 91, 97, 113, 118, 198.

(b) Natural Sciences—12 to 16 semester hours selected from B Sc 11-12; Chem 11–12; Geol 1–2; Phys 1, 2. Either B Sc 11–12 or Chem 11–12 must be selected.

(c) Social Studies—12 semester hours selected from Anth 1-2; Econ 1-2; Geog 51, 52; P Sc 4 or 5, 6; Psyc 1, 5-6; Soc 1, 2.

3. Required courses for the major (48 semester hours):

(a) B Sc 140 (4 semester hours).

(b) 20 semester hours selected from B Sc 111, 115, 118, 123, 124, 167 (Biology); B Sc 109, 110, 125 (Botany); B Sc 101, 102, 140, 143, 144 (Zoology); Chem 50, 151-52, 153-54; Geol 5, 125, 147, 163, 172, 181; Phys 6, 31, 40, 41, 42, 51, 52.

(c) 18 semester hours selected from Anth 151, 152, 170; Econ 101, 102, 157; Geog 127, 132, 133, 134, 140, 142, 144, 145; P Sc 103, 104, 108, 146; Psyc 151, 156; Soc 126, 127, 128.

(d) Envr 151-52 (6 semester hours).

The science and social studies courses listed under 3(b) and 3(c) above must be taken in not more than *three* departments.

In choosing elective courses for both the Bachelor of Arts and Bachelor of Science degree programs, students are reminded that permission of the Dean of Columbian College of Arts and Sciences and the Committee on Environmental Studies is necessary to take courses not offered by Columbian College of Arts and Sciences, and that a maximum of 12 semester hours of such courses may be taken. The following may be of interest to the Environmental Studies major: B Ad 101, 171, 172, 173, 174, 201, 203; *CE 194, 197; PE 152; U&RP 153, 201, 205. The permission of the instructor, the department chairman, and the Dean of the School of Government and Business Administration is necessary to take graduate courses (numbered 201 and above) in that School.

SECOND GROUP

151–52 **Senior Seminar in Environmental Studies** (3–3)

Limited to majors in Environmental Studies. Directed reading and discussion of contemporary environmental problems.

Epidemiology and Environmental Health

Professor J.W. Millar (*Chairman*)
Associate Professor C.R. Hartman
Associate Clinical Professors W.J. Zukel, L.S. Jaffe
Associate Professorial Lecturers C.E. Alexander, Jr., H.A. Bradford

* See the *School of Engineering and Applied Science* catalogue for CE (Civil Engineering) courses.

Assistant Professors E.N. Kassira, Yousef Al-Doory, F.L. Hurley (*Biostatistics*)
Assistant Clinical Professors Lawrence Pyle, Jr., John Vinyard, Jr.
Assistant Professorial Lecturers S.H. Barboo, Jr., N.E. Manos, J.A. Lee, Olga Joly, D.V. Lassiter, Elizabeth Force

Bachelor of Science in Environmental Health.—This degree program of Columbian College of Arts and Sciences is offered off campus and is administered by the College of General Studies. Interested students should request the *College of General Studies* catalogue.

Master of Science in the field of Mycology.—An interdepartmental degree offered by the departments of Biochemistry, Epidemiology and Environmental Health, and Microbiology.

Prerequisite: a Bachelor's degree with a major in Biology, Botany, Chemistry, or Zoology from this University, or an equivalent degree. The undergraduate program should have included the following courses, or equivalent: B Sc 11–12; Chem 11–12, 151–52, 153–54.

Required: the general requirements, pages 92–99. Candidates must complete either (1) a minimum of 30 semester hours including Bioc 221; Epid 201, 217 (4 semester hours), 230 (2 semester hours), 299–300; Micr 201, 231, 251, 255; or (2) a minimum of 36 semester hours without a thesis including Bioc 221–22; Epid 201, 217 (4 semester hours), 218 (2 semester hours), 230 (2 semester hours); Micr 201, 225, 231, 251, 255.

Doctor of Philosophy field of study in Human Ecology.—See pages 92–96, 99–101, for requirements for the degree.

201 **Introduction to Epidemiology and Environmental Health** (2) — Millar and Staff

Required for medical students; open to qualified graduate students. Principles and methodology of epidemiology and biostatistics. Ecological approach to health and disease, including parasitology and mycology. (Spring)

217 **Clinical Mycology** (2 or 4) — Al-Doory

Study of clinical aspects of mycotic diseases; emphasis on diagnosis of disease and identification of etiologic agents. (Fall)

218 **Medical Parasitology** (1 or 2) — Millar and Staff

For medical students; open to qualified graduate students. Study of host-parasite relationships. Clinical recognition of the important parasites in medicine. (Fall)

219 **Malariology** (1) — Kassira and Staff

The general principles of the diagnosis, life cycle, pathogenicity, treatment, and prevention of malaria. Prerequisite: Epid 201 or equivalent. (Fall)

230 **Biostatistics** (2 or 4) — Hurley, Manos

Introduction to statistical analysis, theory of measurements and distribution, including significance testing, basic concepts of probability and association, sampling techniques, design of experments, and introduction to computers. (Fall and spring)

239 **Introduction to Computer Applications in Health Sciences—FORTRAN** (1) — Millar and Staff

Orientation to the use of large computers in a medical environment. Use

of FORTRAN, a computer independent language, for the solution of simple computational tasks. (Fall and spring)

240 **Computer Applications in Health Sciences—PL/1** (1) Millar and Staff
Introduction to the use of PL/1 for the solution of advanced computational tasks. (Fall and spring)

295 **Research in Epidemiology** (arr.) Staff
Participation in experimental studies in infectious diseases and research in community medicine. Admission by permission of Department. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

301 **Applied Epidemiology** (2 or 3) Staff
(*Formerly Epidemiology and Environmental Health*)
Lectures, seminars, and case studies. Epidemiological solutions to health problems of the community. (Fall and spring)

351 **Global Epidemiology** (1) Staff
For medical students; open to graduate students by arrangement. Geographic pathology of disease and international aspects of disease prevention and control, including world demographic problems. (Fall)

352 **Seminar: Experimental Epidemiology** (2) Hurley
For medical students; open to graduate students by arrangement. Student participation in definitions, design, and methods for developing epidemiologic studies of diseases. Prerequisite: Epid 230 or permission of instructor. (Fall)

353 **Military Preventive Medicine** (1) Staff
Operational medicine, environmental and sanitation problems, epidemiologic diseases of military importance and their prevention and control. Medical aspects of aerospace and submarine medicine. (Fall)

354 **Seminar: Human Ecology** (1) Lee and Staff
Ecology—man within the framework of reference—physical and cultural anthropology, geography, sociology, urban planning, public health, and public administration. (Fall)

356 **Introduction to Environmental Health** (3) Jaffe, Millar
A survey of organizations, function, current practices, and federal, state, and local regulations to control the environment. (Spring)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Experimental Humanities*

Professor C.C. Mondale
Adjunct Assistant Professor R.S. French

EXPERIMENTAL HUMANITIES

FIRST GROUP

4 **Contemporary Political Imagination** (3)

A freshman course; limited enrollment. Students will be housed in Thurston Hall. Field-study and case-study of value conflicts implicit in selected political issues involving federal policy and legislation. Concurrent registration in a special section of P Sc 4 required. Students registering for Hum 4 in the fall semester will be required to register for Hum 6 in the spring semester. Admission by permission of instructor. (Fall)

6 **Contemporary Political Imagination** (3)

Continuation of Hum 4. Concurrent registration in a special section of P Sc 6 required. Prerequisite: Hum 4. (Spring)

†26 **Environmental Issues** (3) French, Pederson, Schiff

An interdisciplinary analysis of selected aspects of the population question, pollution and human health, urban environmental problems, issues of economic growth and development, technology and public policy. (Fall and spring)

37 **Computer Technology and Social Issues: the Search for New Alternatives** (3) Mondale and Interdisciplinary Team

An all-university course designed primarily for freshmen. Student team-study of selected social issues related to developing computer technology. Introduction to computer systems and to applications and long-range implications of the new technology. (Fall)

40 **Washington, D.C., Culture and Politics** (3) French and Interdisciplinary Team

An all-university course designed primarily for freshmen and transfer students. Major facets of metropolitan life, past and present, analyzed by faculty, students, and community leaders. (Fall)

51–52 **The Individual and the City** (3–3) Yezer

Sophomore-level course. Hum 51: impact of urbanization on individuality as revealed in the arts and literature, and as analyzed in scientific studies of culture and personality. Hum 52: individual and/or group study of agencies of change, with special reference to Washington, D.C., area. Admission by permission of instructor. (Academic year)

* Administered by the Division of Experimental Programs.
† Offered jointly by the Division of Experimental Programs and the departments of Biological Sciences and Geography and Regional Science.

SECOND GROUP

101–2 **Supervised Field-Study** (6–6)
(Formerly Supervised Work-Study)
Community-based projects supervised by appropriate faculty. Juniors and seniors admitted by permission of instructor. Prerequisite to Hum 102: Hum 101. (Hum 101 and 102—fall and spring)

194 **The Washington, D.C., Spanish-American Community** (3)
Examination of major problems confronting the Spanish-American population in Washington, D.C.

196 **Urban Ecology Workshop** (3)
Legal, scientific, political, and ethical aspects of specific environmental issues in the Washington, D.C., metropolitan area.

198 **Conference on Policy Studies and the Humanities** (6 to 15) Mondale and Interdisciplinary Team
Examination of specific contemporary policy issues in relation to alternative social goals. A new policy issue will be selected each year. Open only to graduate, law, and medical students, and undergraduate seniors by permission of instructor. (Spring)

SERVICE–LEARNING EXPERIMENTAL HUMANITIES

SECOND GROUP

150 **Learning through Service** (3 to 15) Mondale and Staff
Open only to juniors and seniors. Students undertake an assignment with an off-campus agency or group. Arrangements are made through a "contractual" agreement among the student, the agency or group, and the Service-Learning Program, with the amount of credit depending upon the nature of the assignment. (Fall and spring)

Forensic Science

Professors T.P. Perros (*Chairman*), A.H. Desmond
Adjunct Professors I.W. Conrad, Briggs White
Professorial Lecturers K.M. Earle, R.C. Froede, C.J. Stahl III
Adjunct Associate Professor C.G. McWright
Associate Professorial Lecturers P.E. Besant-Matthews, F.B. Johnson, J.G. Zimmerly, I.M. Sopher, E.H. Williams
Adjunct Assistant Professors M.S. Clark, J.L. Gormley, T.F. Kelleher, Jr.
Assistant Professorial Lecturers R.C. Boyers, M.G. Dixon

Master of Science in Forensic Science.—This interdisciplinary degree program may include course work from the biological and physical science departments of the Graduate School of Arts and Sciences, and from the School of Government and Business Administration and the National Law Center. The student will work closely with his advisers in setting up a program that meets his interests, needs, and background knowledge. The Department is also affiliated with the Armed Forces Institute

of Pathology in a program of mutual exchange among students, courses, and facilities. For further information, contact the Department of Forensic Science.

Prerequisite: a Bachelor's degree from an accredited institution and academic or professional training in the sciences.

Required: the general requirements, pages 92–99. The program of study consists of 36 semester hours of approved graduate-level courses with or without a thesis (equivalent to 6 semester hours). The program of study must include the following courses: ForS 201, 202, 203, 204, 224, 226, 227 or 228, 261. The remaining semester hours of course work must be selected from approved courses in the areas of forensic science, law, management science, and science; however, the selection of these courses must be determined by prior consultation with and approval by an academic adviser in the Department of Forensic Science. All candidates are required to pass a Master's Comprehensive Examination. If a candidate elects a thesis, the thesis work is directed by one of the participating departments in the Forensic Science Program. There is no tool requirement.

Elective courses may be selected from the following: Forensic Science courses, other than those required in the program; Anat 252, 256, 260, 261; Bioc 221–22; B Sc 104, 111, 115, 123, 124, 127, 129, 130, 138, 148, 165, 205, 245, 265; Chem 111–12, 113–14, 122, 134, 219, 221, 222, 235-36; Mgt 201, 204, 207, 240; Micr 231, 257; Path 201, 295; Phar 201, 272; Phys 167, 168, 170, 175, 231, 232, 233–34, 236, 241, 243, 244, 247, 249, 251–52.

THIRD GROUP

201 **Forensic Science in Law Enforcement I: Serology, Microscopy, Mineralogy** (3) Desmond

Principles in forensic serology; microscopic and optical analyses of human and animal reproductive cells, hairs, natural and synthetic fibers, and materials of a mineral nature. (Fall)

202 **Forensic Science in Law Enforcement II: Instrumental Analysis** (3) Perros

Principles and application of various instrumental methods to the examination of criminal evidence, including chromatographic and spectrophometric techniques and mass spectrometry. (Spring)

203 **Forensic Science in Law Enforcement III: Examination of Questioned Documents** (3) Williams

Theory and principles of handwriting and handprinting, duplicating processes, paper manufacture, and fiber analysis; studies of paper and methods of examination of questioned documents. (Fall)

204 **Forensic Science in Law Enforcement IV: Firearms and Tool-mark Identification** (3) Staff

Study of methods for identifying firearms, cartridge casings, tool marks, tire marks, and footprints of significance in criminal procedures. (Spring)

205 **Survey of Forensic Science** (3) Staff

Survey of some areas of contemporary forensic sciences.

214 **Forensic Psychiatry** (3) Staff

Introduction to the constructs of dynamic psychiatry, the psychiatric evolution, and the nomenclature of mental disorders. Consideration of expert testimony in hospitalization and criminal cases.

224 **Introductory Criminal Procedure, Evidence and Legal Methods** (3)

Principles of criminal procedure, preparation and presentation of evidence, examination of witnesses, and the methods of legal research. (Fall)

225 **Advanced Criminal Evidence** (3)

Study of procedural rules affecting the collection, accessibility, and use of physical evidence with emphasis on court opinions defining the rules of search and seizure. Prerequisite: ForS 224. (Spring)

*226 **The Crime Lab, the Forensic Scientist, and the Criminal Lawyer** (3)

Qualifications and preparation of an expert witness and the relationship and responsibilities of the expert in court in criminal and civil cases. Prerequisite: ForS 224.

*227 **Advanced Criminal Procedure** (3)

Decision to arrest, prosecutive discretion, bail, the preliminary hearing, right to a speedy trial, discovery, plea bargaining, publicity, post-conviction procedures. Prerequisite: ForS 224. (Fall)

*228 **Administration of Criminal Justice** (3)

Consideration and analysis of selected advanced problems in the administration of criminal justice. Emphasis will be placed on the role and professional responsibilities of prosecutor and defense counsel and on development trends in the law. Prerequisite: ForS 224. (Fall and spring)

*229 **The Police and the Community** (3)

Problems and potential of contemporary urban law enforcement: the role and perspective of the police officer. Prerequisite: ForS 224. (Spring)

*231 **Law and Criminology I: Search for the Causes of Criminal Behavior** (3)

Role which knowledge of crime causation may play in assessing devices to control deviant behavior: factors related to criminal behavior; current causal theories. Prerequisite: ForS 224. (Fall)

*232 **Law and Criminology II: Society's Responses to the Criminal Offender** (3)

Study of punitive, mechanical, and correctional approaches to offenders. Emphasis on changing responses to criminal and delinquent behavior and research on effectiveness. Prerequisite: ForS 224. (Spring)

*233 **Post-conviction Dispositions—Dynamics of the Law of Criminal Corrections** (3)

Study of statutes, practice, problems and potential of alternatives facing a defendant: mental fitness to proceed to trial, probation, sentencing, parole, prisoner rights. Prerequisite: ForS 224. (Fall and spring)

* In special circumstances, students may take similar courses in the National Law Center with the prior approval of the Dean of the National Law Center.

254 **Seminar: Recent Developments in Forensic Science** (2) Staff
Study of current advances and problems in law and science relating to forensic science.

260 **Introduction to Human Physiology and Pathology** (2)
Introduction to physiology and pathology of the human body; emphasis on medical terminology. Basic understanding of the body functions in health and disease.

261 **Introduction to Forensic Pathology** (2)
Precise terminology and scientific techniques used in medicolegal investigations: sudden or unexpected deaths, homicides, suicides, accidental deaths, and trauma.

262 **Current Trends in Forensic Pathology and Forensic Odontology** (3)
Emphasis on (1) the relationship among law, medicine, and law enforcement; and (2) the advancement of forensic knowledge.

263 **Seminar: Law, Medicine, and Forensic Sciences** (3)
The relationship of the forensic sciences to the fields of law, medicine, and law enforcement.

264 **Medical Jurisprudence** (3)
Legal problems inherent in the practice of medicine. Laws regulating health personnel and health industry. Emphasis on professional liability.

265 **Criminal Procedure in Forensic Medicine** (2)
Problems in the use of evidence in criminal proceedings; emphasis on the use of medical and related evidence.

266 **Forensic Neuropathology** (3)
Fundamentals of neuropathology of natural disease and traumatic injuries of the nervous system, including demonstrations of gross pathologic specimens.

267 **Applications of Histochemistry to the Forensic Sciences** (3)
Chemical and physical methods for the localization, identification, and characterization of materials under the microscope, including carbohydrates, enzymes, lipids, minerals, pigments, and proteins.

268 **Photography in the Forensic Sciences** (2)
Basic use of forensic photography, including selection and use of equipment, photographs as evidence, close-up work, and common misconceptions.

269 **Principles of Forensic Toxicology** (2)
Analytical procedures used for the detection of drugs, poisons, and toxic agents in biological specimens. Admission by permission of instructor.

295 **Research** (arr.) Staff
Open to qualified Master's degree students. Research on problems approved by the departmental adviser. May be repeated for credit.

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

French

See "Romance Languages and Literatures."

Genetics—Graduate Study

COMMITTEE ON GENETICS

S.O. Schiff, (*Chairman*), W.F. Anderson, V.H. Cohn, Jr., Rosalie De Giovan
Donnelly, G.S. Edwards, W.G. Flamm, T.B. Friedman, R.C. Gallo, J.
Houck, C.B. Jacobson, Kenneth Krell, W.M. Leach, C.D. Lytle, C.R. Mer
W.G. Nash, J.C. Petricciani

The Graduate School of Arts and Sciences offers an interdepartmental progra
leading to the degrees of Master of Science and Doctor of Philosophy in the field
Genetics. This program is directed by a Committee whose members are drawn fro
the departments of Biochemistry, Biological Sciences, Child Health and Develo
ment, Microbiology, Obstetrics and Gynecology, and Pharmacology; and from th
government agencies—the Bureau of Radiological Health, the National Institutes
Health, and the National Institute of Mental Health.

A baccalaureate degree is required for admission to the degree program. Th
undergraduate program must have included the following: 8 semester hours each
biology, inorganic chemistry, and organic chemistry; 6 to 8 semester hours in physi
and 6 semester hours of English composition and literature. While not required fo
admission, courses in embryology, histology, genetics, and mathematics are strong
recommended.

Master of Science in the field of Genetics.—Required: the general requirement
pages 92–99. The 30 semester hours required in this program must include Gn
201–2 and Gnet 299–300. The remaining 20 semester hours of course work are
be selected, with the approval of the Committee on Genetics, from the departmen
courses listed below.

Doctor of Philosophy in the field of Genetics.—Required: the general require
ments, pages 92–96, 99–101. The program of study must include Gnet 301–2, 8 to
semester hours of biochemistry, 6 to 8 semester hours of cell biology, 10 to
semester hours of genetics, and 2 or 3 semester hours of statistics. These cours
may be selected from the departmental listings on pages 299–300.

GENETICS

THIRD GROUP

201–2 **Advanced Problems in Genetics** (2–2)

Individual study with each member of the Committee on Genetics, 8
quired of all Master's degree candidates in the field of Genetics. (A
demic year)

295 **Research** (arr.)

Open to qualified Master's degree students. Research on problems
proved by the Committee on Genetics. May be repeated for credit.
(Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Academic year)

FOURTH GROUP

301–2 **Advanced Problems in Genetics** (2–2) Staff
Individual study with each member of the Committee on Genetics. Required of all students preparing for the Doctor of Philosophy general examination whose field of study is Genetics. (Academic year)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

ANATOMY

203 *Human Embryology* (1)
256 *Human Genetics* (1)
260 *Electron Microscopy in Cellular Biology—Lecture* (1)
261 *Electron Microscopy in Cellular Biology—Laboratory* (2)

BIOCHEMISTRY

221–22 *General Biochemistry* (4–5)
224 *Biochemistry of Enzymes* (1)
227 *Biochemistry Seminar* (1)
258 *Inherited Metabolic Diseases* (1)
266 *Biochemical Genetics* (1)

BIOLOGICAL SCIENCES

BIOLOGY

108 *Organic Evolution* (3)
115 *Cytology* (4)
118 *Advanced Cytology* (3)
123 *Cell Biochemistry* (3)
124 *Cell Biochemistry Laboratory* (1)
127 *Genetics* (4)
138 *Advanced Genetics* (3)
167 *Radiation Biology* (3)
206 *Seminar: Radiation Biology* (3)
207 *Seminar: Origin of Life* (3)
227 *Seminar: Genetics* (3)

ZOOLOGY

145 *Introduction to Vertebrate Embryology* (3)

EPIDEMIOLOGY AND ENVIRONMENTAL HEALTH

230 *Biostatistics* (2 or 4)

MICROBIOLOGY

227 *Basic Genetic Mechanisms* (1)
258 *Microbial Genetics* (2)

OBSTETRICS AND GYNECOLOGY*

391 *Cytogenetics* (1)
392 *Reproductive Genetics* (1)
395 *Gametogenesis* (1)
399 *Medical Genetics* (1)

PHARMACOLOGY

256 *Molecular Pharmacology* (2)

PHYSIOLOGY

201 *Physiology* (8)
273 *Investigative Electron Microscopy* (3)

STATISTICS

91 *Principles of Statistical Methods* (3)
117 *Analysis of Variance* (3)

Geography and Regional Science

Professor Marvin Gordon *(Chairman)*
Associate Professor J.C. Lowe
Assistant Professor E.O. Pederson

Bachelor of Arts with a major in Geography (Departmental).—The following re quirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87.
2. Required courses in the major—24 semester hours of second-group Geography and Regional Science courses, to be chosen in consultation with a department adviser.

Master of Arts in the field of Geography.—Prerequisite: a Bachelor of Arts degree with a major in Geography from this University, or an equivalent degree.

Required: the general requirements, pages 92–99. The minimum requirement consists of 30 semester hours of approved course work including a thesis; with the approval of the Department, a student may elect a program of study without thesis. A Master's Comprehensive Examination in three fields is required. Candi

* See the *School of Medicine* catalogue.

dates must fulfill the tool requirement by either passing a reading knowledge examination in one foreign language or satisfactorily completing the tool requirement in Statistics.

Bachelor of Arts in Education with a teaching field in Geography.—Prerequisite: the Education curriculum, page 78.
Required: the Geography option and the professional courses listed on pages 113, 119.

Master of Arts in Education with a field in Elementary or *Secondary Education (specializing in Geography).*—Prerequisite: a Bachelor's degree with sufficient concentration in Geography to permit successful pursuit of graduate study in the Department of Geography and Regional Science. Candidates must be accepted by both the School of Education and the Department of Geography and Regional Science.
Required: the general requirements, pages 123–25, including 15 semester hours of graduate courses in Geography and Regional Science.

FIRST GROUP

*26 **Environmental Issues** (3) Pederson, Schiff
An interdisciplinary analysis of selected aspects of the population question, pollution and human health, urban environmental problems, issues of economic growth and development, technology and public policy.

51 **Introduction to Geography** (3) Staff
General survey of the various systematic, physical, and human fields of geography which play a role in the analysis and interpretation of man-environment relationships in both spatial and ecological contexts. (Fall and spring)

52 **Introduction to Economic Geography** (3) Pederson
(Formerly World Regional Patterns)
Examination of the basic principles which determine the location of economic activities on the surface of the earth. (Spring)

SECOND GROUP

103 **Cartography and Graphics** (3) Staff
Principles of cartography; emphasis on design and presentation of spatial data. Map projections, field surveying, use of air photographs, map interpretation, problems in thematic mapping. Laboratory fee, $15.

104 **Special Techniques in Cartography** (3) Staff
Descriptive and statistical techniques applied to spatial problems. Consideration of measures of central tendency, sampling, shape, nearest neighbor analysis, quadrat analysis, computer graphics. Laboratory fee, $15.

125 **Transportation Geography** (3) Lowe
Consideration of the spatial aspects of interaction, diffusion, and information transfer, including nodal activity and hierarchies, network geometry, gravity models, and diffusion processes. (Fall)

*Offered jointly by the Division of Experimental Programs and the departments of Biological Sciences Geography and Regional Science.

126 **Economic Geography** (3) Staff
Consideration of theories and hypotheses concerning the location of economic activities: services, manufacturing, and agricultural production. Exercises in computer-oriented locational analysis.

127 **Population and Settlement** (3) Gordon
Patterns of world population; factors contributing to population pressures, growth, and migrations.

132 **Resources and Environment** (3) Staff
Analysis of the spatial pattern of resources and the problems created by man's utilization of unevenly distributed resources. (Fall)

133 **Geography of Poverty and Hunger** (3) Staff
Consideration of the locational aspects and correlates of poverty and hunger; rural and urban poverty regions; regional food budgets and taboos; programs concerned with the elimination of poverty and hunger. (Spring)

134 **Location of Industry** (3) Staff
Geographical distribution of manufacturing industries in light of location theory and behavioral factors. Methods of selecting optional locations for new plants.

139 **Geographic Perspectives on Current World Problems** (3)

140 **Urban Geography** (3) Pederson
Analysis of the internal spatial structure of cities; emphasis on explaining patterns of location within the city. (Spring)

141 **Urban Settlement** (3) Pederson
Distribution of urbanization on the surface of the earth; processes which lead to urbanization; theories which can be used to analyze the location of cities.

142 **Urban Environments and Systems** (3) Lowe
Consideration of the interrelationships among (1) urban physical environments, (2) urban service systems, (3) urban social environments, and (4) behavioral aspects of urban life. (Fall)

143 **Human Geography of the Washington, D.C., Area** (3) Pederson
The Washington, D.C., area as a laboratory for examination of basic problems in human geography. Field observations.

144 **Environmental Adaptation** (3) Lowe
Consideration of the man-environment relationship; emphasis on bioclimatological responses, disease ecology, nutritional demands, land capabilities, artificial environments, and environmental perception. (Spring)

145 **Cultural Geography** (3) Staff
Analysis of the relationships between culture and environment; emphasis on spatial and ecological considerations.

146 **Political Geography** (3) Staff
Analysis of the interrelationships between the political community and the human and physical environment. (Fall and spring)

161 **Latin America** (3) Gordon
Examination of spatial characteristics of physical and cultural phenomena in Middle and South America. (Spring)

189–90 **Readings in Geography** (arr.) Staff
(Academic year)

THIRD GROUP

205 **Introduction to Regional Science** (3) Staff
Introduction to recent developments in spatial analysis, including the fitting of probability functions to areal data; multivariate analysis; models optimality of numerical methods of regional delimitation. (Fall)

221 **Seminar: Cultural Geography** (3) Staff
Study of the noneconomic processes which affect the location of human activity. Topics to be discussed are environmental perception and evaluation, social definitions of space, and diffusion of innovations.

223 **Seminar: Population and Resources** (3) Gordon
Analysis of the spatial variations and interrelationships of population and resources. (Spring)

224 **Seminar: Political Geography** (3) Pederson
Study of the spatial relationships between the political community and environment. (Spring)

225 **Seminar: Transportation Geography** (3) Lowe
Analysis of human spatial interaction; emphasis on networks, graph theory, gravity, interaction and potential models, migration models and diffusion processes.

243 **Seminar: Urban Geography** (3) Lowe
Functional processes affecting the evolving morphology and internal spatial patterns of urban phenomena; emphasis on economic factors, behavioral considerations, and impact of time. (Spring)

244 **Seminar: Urban Systems** (3) Pederson
Analysis of the basic concepts of urban hinterland, urban hierarchies, urban economic base, and functional typologies with a view to evaluating the significance of central place theory. (Fall)

261 **Seminar: Geography of Latin America** (3) Gordon
Analysis of man-land relationships in Latin America.

265 **Seminar: Geography of the Soviet Union** (3) Baclawski
Physical features, economic geography, natural and energy resources, industries, transportation, agriculture, population trends; emphasis on population patterns along borderlands, especially Sino-Soviet border. (Spring)

266 **Seminar: Geography of China** (3) True
Physical and economic geography; emerging industries, energy resources, transportation system. Emphasis on population distribution and growth; regional geography of selected areas. (Fall)

287 **Seminar: Problems in Latin American Civilization** (3) Gordon
Interdisciplinary seminar partially guided by a specialist within the meth
odology of his chosen discipline; each student writes a report on some
aspect of a selected key theme. Admission by permission of instructor
(Spring)

295 **Research** (arr.) Staff
May be repeated once for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Geology

Professors Geza Teleki (*Chairman*), G.V. Carroll, Charles Milton (*Research*),
F.R. Siegel
Adjunct Professors J.W. Pierce, E.G. Kauffman, I.G. Sohn
Professorial Lecturers Nicholas Hotton, Daniel Appleman, P.M. Kier, H.T.
Evans, Jr.
Associate Professors A.G. Coates, R.C. Lindholm, J.F. Lewis
Associate Professorial Lecturers W.E. Maloney, M.A. Buzas, J.E. Hazel, Isidore
Zietz, Alfonso Geiger, M.D. Turner
Assistant Professorial Lecturers F.J. Collier, T.L. Hughes, E.T. Miller

Bachelor of Arts or *Bachelor of Science with a major in Geology* (*Departmental*)
—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87.
2. Prerequisite course—Geol 21–22.
3. Required courses in related areas—(a) Chem 11–12; (b) Math 30 (for the
degree of Bachelor of Arts) or Math 30 and 31 (for the degree of Bachelor of
Science); (c) Stat 91; and (d) B Sc 11–12 or Phys 3 and 4 (for the degree of
Bachelor of Arts) or B Sc 11–12, *and* Phys 1, 2, or Phys 3, 4 (for the degree of
Bachelor of Science).
4. Required courses in the major—Geol 111–12, 115, 117, 118, 122, 151–52 for
both the degree of Bachelor of Arts and Bachelor of Science; Geol 172, 189, 195 for
the Bachelor of Science degree only.

Master of Arts or *Master of Science in the field of Geology*.—Prerequisite: the
degree of Bachelor of Arts or Bachelor of Science, respectively, with a major in
Geology from this University, or an equivalent degree.

Required: the general requirements, pages 92–99. Master of Science degree
candidates must include in their program of study Geol 141, 163, 205, 266, and
Math 31. Geol 299–300 *Thesis Research* is required for both degrees. Candidates
must pass a Master's Comprehensive Examination before submitting their thesis work.
A reading knowledge examination in French, German, Russian, or Spanish (with
permission of Department), must be passed before beginning the thesis work or
before beginning the third semester of graduate work. With the permission of the
Department, candidates in the Master of Science program may substitute another
approved tool subject in lieu of the foreign language requirement.

Master of Science in the field of Geochemistry (*an interdepartmental degree offered
by the departments of Geology and Chemistry*).—Prerequisite: a Bachelor's degree
with a major in Geology or in Chemistry from this University, or an equivalent
degree.

Required: the general requirements, pages 92–99, including Chem 111–12; Geol 141, 241, 249; Geol 246 or Chem 213; and Geol 299–300. The Master's Comprehensive Examination must be taken before registration for the second half of the thesis work. A reading knowledge examination in a foreign language, approved by the Department of Geology or Chemistry, must be passed prior to beginning the third semester of graduate work or before beginning the thesis work, whichever occurs first.

Doctor of Philosophy in the field of Geology.—Required: the general requirements, pages 92–96, 99–101, including passing a reading knowledge examination in an approved foreign language plus the satisfactory completion of Stat 49; and the satisfactory completion of the General Examination in three fields, one of which must be in Petrology, Stratigraphy, or Structural Geology.

Research fields: Geomorphology, Mineralogy, Paleontology, Petrology, Sedimentology, Stratigrapy, and Structural Geology.

Doctor of Philosophy in the field of Geochemistry (an interdepartmental field offered by the departments of Geology and Chemistry).—Required: the general requirements, pages 92–96, 99–101, including passing a reading knowledge examination in an approved foreign language plus the satisfactory completion of Stat 49; and the satisfactory completion of the General Examination in four fields, including geochemistry and chemistry.

Bachelor of Arts in Education with a teaching field in Earth Science.—Prerequisite: the Education curriculum, page 78.

Required: the Earth Science option and the professional courses listed on pages 111, 119.

FIRST GROUP

1–2 **Introductory Geology** (3–3) Staff

Lecture (2 hours), laboratory (2 hours), optional field trips. Survey covering the principles of geology; emphasis on man's effect on the environment. Laboratory fee, $12 a semester. (Academic year)

5 **Environmental Geology** (3) Staff

The relation of man and society to natural environment; population evolution and resources; economic, legal, and political aspects. (Fall and spring)

14 **Field Petrology** (3) Carroll

Lecture (2 hours), laboratory and field (3 hours). Macroscopic study of rocks. Prerequisite: Geol 1–2 or 22 (Geol 22 may be taken concurrently). Laboratory fee, $12. (Fall)

21–22 **Physical and Evolutionary Geology** (3–3) Lindholm, Coates

Lecture and laboratory (5 hours). Principles of geology as a base for further study in geology and related sciences. Laboratory fee, $12 a semester. (Geol 21—spring; Geol 22—fall)

SECOND GROUP

101 **History of Geological Sciences** (3) Teleki

Development of scientific thought; history of geological and related sciences. (Fall)

111–12 **Mineralogy** (4–3) Carroll

Lectures and laboratory. Geol 111: morphological and optical crystallog-

raphy. Geol 112: paragenetic and systematic mineralogy. Admission by permission of instructor. Laboratory fee, $12 a semester. (Academic year)

Appleman

113 **Crystallography** (3)

Point-group and space-group theory, fundamentals of crystal structure, X-ray diffraction theory and application. Prerequisite: Math 31. Laboratory fee, $15. (Fall or spring)

Lewis

117 **Petrology** (2)

Introduction to silicate phase systems; physics and chemistry of crustal and magmatic processes; volcanic processes and products. Prerequisite: Geol 21, 111–12; Phys 1 or equivalent; or permission of instructor. (Spring)

Lewis

118 **Petrology Laboratory** (2)

Open only to Geology majors. Concurrent registration in Geol 117 required. Laboratory fee, $12. (Spring)

Carroll

122 **Structural Geology** (4)

Lectures and field trips. Interpretation of geologic formations on basis of their structures; emphasis on applications to geologic field work. Prerequisite: Geol 22, or Geol 2 and 14. Laboratory fee, $8. (Spring)

Pierce

125 **Marine Geology** (3)

Lecture and map work. Principles of oceanography and submarine geology; topography, crustal structure, sedimentary processes, and marine environment. Prerequisite: Geol 1–2. (Spring)

Teleki

128 **Geomorphology** (3)

Lecture (2 hours), laboratory and field trips as arranged. Nature and evolution of earth forms. Prerequisite: Geol 21–22, or permission of instructor. (Spring)

Geiger

136 **Engineering Geology** (3)

For students in the School of Engineering and Applied Science. Geological principles and processes and their application to civil and mechanical engineering. Prerequisite: Math 31, Phys 2; or permission of instructor. (Spring)

Siegel

141 **Introductory Geochemistry** (3)

Lecture (2 hours), laboratory as arranged. Principles and theories on abundance, relationships, and distribution of the elements in various rock and mineral species. Prerequisite or concurrent registration: Geol 117 or equivalent; Chem 11–12; Math 30; Phys 1, 2; or permission of instructor. Laboratory fee, $12. (Fall)

Siegel

147 **Chemical Geology in the Earth and Ocean Sciences** (3)

Introduction to geochemical and chemical principles involved in geological systems and their application to contemporary problems in oceanology, pollution, and mineral exploration. Laboratory fee, $12.

Coats

151–52 **Invertebrate Paleontology** (3–3)

Lecture and laboratory (5 hours), field trips as arranged. A systematic treatment of the invertebrate fossil groups, emphasis on the macroinverte-

brates, Prerequisite: Geol 1–2. Laboratory fee, $12 a semester. (Academic year)

154 **Vertebrate Paleontology** (3) Hotton

Lecture (2 hours), laboratory or field as arranged. General features of vertebrate morphology and evolution; problems of paleoecology and adaptation. (Fall)

157 **Methods of Systematic Paleozoology** (3) Sohn

Lecture and discussion. Introduction to bibliographic source and rules of zoological nomenclature. Presentation of data, including synonymies and keys. Prerequisite: Geol 151–52 or B Sc 102. (Fall)

158 **Micropaleontology** (3) Sohn

Lecture (2 hours), laboratory as arranged. Identification with binocular microscope of important microfossil groups. Micropaleontological techniques. Prerequisite: Geol 157 or permission of instructor. Laboratory fee, $12. (Fall or spring)

163 **Sedimentation** (4) Lindholm

Lecture (2 hours), laboratory (4 hours), field trips as arranged. Principles of sedimentation, analysis and interpretation of sedimentary processes and environment, laboratory experiments in the properties of sedimentary particles. Prerequisite: Geol 111 or permission of instructor. Laboratory fee, $15. (Fall)

172 **Regional Geology** (2) Staff

Lecture, research, and discussion of major geologic or physiographic regions. Prerequisite: Geol 122. (Fall)

181 **General Oceanography** (3) Maloney

Chemical and physical properties of sea water, movements of water masses, meteorological interrelations, ecology of marine plants and animals. Prerequisite: Math 33 or equivalent, or permission of instructor. (Spring)

189 **Geophysics of the Solid Earth** (2) Zietz

Introduction to physical properties and origin of the interior and surface features of the earth. Prerequisite: Math 31, Phys 1; or permission of instructor. (Fall)

195 **Field Work** (2) Staff

Weekend field trips. Surveying, geological mapping, and specific field work methods. (Spring)

199 **Undergraduate Research** (arr.) Staff

Problems approved by the staff. May be repeated once for credit. (Fall and spring)

THIRD GROUP

205 **Seminar in Geology** (3) Staff

Special topics each semester. May be repeated for credit. (Fall and spring)

214 **X-ray Mineralogy** (3) Appleman
Problems in X-ray mineralogy, crystal chemistry of rock-forming minerals. Laboratory fee, $15. (Fall or spring)

216 **Sedimentary Petrography** (3) Lindholm
Identification, classification, and interpretation of common sedimentary rocks by means of the petrographic microscope. Prerequisite: Geol 112, 163; or permission of instructor. Laboratory fee, $15. (Spring)

219 **Petrogenesis I** (3) Lewis
The origin of selected igneous and metamorphic rock types. Laboratory fee, $15. (Fall)

220 **Petrogenesis II** (3) Lewis
Laboratory fee, $15. (Spring)

224 **Advanced Structural Geology** (3) Lewis
Methods of study and the hypotheses of the genesis of structurally complex rock. Problems of orogeny. Prerequisite: Geol 122 or permission of instructor. (Fall)

241 **Geochemistry** (3) Siegel
Chemical composition and physical properties of sea water, chemical composition and alterations of marine sediments, thermodynamics and biochemical activity in oceans. Methods of analysis and problems of measuring. Prerequisite: Math 32, Phys 40 or 51–52; or permission of instructor. Recommended: Chem 22. Laboratory fee, $18.

242 **Experimental Geochemistry** (3) Staff
Recent advances in geochemistry, instrumental methods and their application. Special topics. Does not repeat itself and may be repeated for credit. Prerequisite: Chem 111–12. (Spring)

243 **Geochemical Prospecting** (3) Siegel
Application of geochemical principles and analyses to the detection of hidden ore deposits. Field trips as arranged. Laboratory fee, $15. (Spring)

246 **Physical Chemistry in Relation to Geologic Problems** (3) Staff
Application of thermodynamics to phase equilibria studies of minerals and rocks.

249 **Seminar: Geochemistry** (2) Siegel (Fall or spring)
Independent topics each semester; may be repeated for credit.

253 **Bioassociational Studies in Paleontology** (3) Hazel
Analysis and interpretation of the distribution of marine animals with emphasis on biogeographic, paleoclimatologic, and biostratigraphic inferences and multiplate techniques.

254 **Interpretive Paleontology** (3) Kauffman and Staff
Comparative study of form and function in fossil and recent organisms as related to the interpretation of evolution. Prerequisite: Geol 151–52. (Spring)

255 **Population Paleoecology** (3) Buzas
Characteristics of populations applicable to the fossil record. Subject matter includes ecosystem concept, habitat, Hutchinsonian niche, life-death, size-frequency distributions, competitive exclusion principle, spatial distributions, relative abundance and diversity, quantification of community biofacies. Prerequisite: Geol 151–52, Stat 91; or permission of instructor. (Fall)

263 **Advanced Sedimentology** (arr.) Pierce
Prerequisite: Geol 163. Laboratory fee, $15. (Spring)

266 **Stratigraphy** (3) Coates, Kauffman
Physical and geological stratigraphy.

282 **Oceanography** (3) Maloney
Boundary processes between oceans and the atmosphere. Principles of dynamics and their application to motion of variables; acoustics of water masses. Prerequisite: Geol 181.

288 **Geophysics for Geologists** (3)
(Formerly Geol 188 Geophysics for Geologists II)
Basic geophysics to assist the geologist in mapping and solving geologic problems. Prerequisite: Math 31; Phys 1, 2; or permission of instructor. (Fall)

295 **Research** (arr.) Staff
Research on problems approved by the Staff. Open to qualified students with advanced training. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Germanic Languages and Literatures

Professor J.C. King
Associate Professors Klaus Thoenelt, Carl Steiner (*Chairman*)
Assistant Professorial Lecturers Margaret Guenther, Lucie Kressley
Instructor B.K. Netland
Lecturer Blanche Gardner

Bachelor of Arts with a major in Germanic Languages and Literatures (*Departmental*).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87.
2. Prerequisite courses—Germ 1–2, 3–4, 9–10, 51–52; or equivalent.
3. Required courses in other areas—6 semester hours of history, and 6 semester hours in one of the following subjects: art history, music history, or philosophy.
4. Requirements for the major—a minimum of 24 semester hours in German courses above the first group, including Germ 179–80; reasonable proficiency in speaking, reading, and writing German.

Master of Arts in the field of Germanic Languages and Literatures.—Prerequisite: a Bachelor of Arts degree with a major in Germanic Languages and Literatures from this University, or an equivalent degree.

Required: the general requirements, pages 92-99, including a reading knowledge of French. The program of study consists of (1) 24 semester hours of approved course work plus a thesis (equivalent to 6 semester hours) in the field of German literature or linguistics or (2) 30 semester hours of approved course work without a thesis.

Bachelor of Arts in Education with a teaching field in German.—Prerequisite: the Education curriculum, page 78.

Required: the German option and the professional courses listed on pages 114, 119.

The Department of Germanic Languages and Literatures, through the Consortium of Universities of the Washington Metropolitan Area, Inc., cooperates in a program leading to the degree of Doctor of Philosophy at Georgetown University.

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

GERMAN

FIRST GROUP

Staff

1–2 **First-year German** (3–3)

A year course: credit toward a degree at this University given on completion of Germ 2. Essentials of German grammar; reading of easy prose. Aural-oral practice in language laboratory. Laboratory fee, $17.50 a semester. (Germ 1 and 2—fall and spring)

Staff

*3–4 **Second-year German** (3–3)

A year course: credit toward a degree at this University given on completion of Germ 4. Selections from modern German prose; continuation and review of grammar. Aural-oral practice in language laboratory. Prerequisite: Germ 1–2 or equivalent. Laboratory fee, $17.50 a semester. (Germ 3 and 4—fall and spring)

Staff

*9–10 **German Conversation and Composition** (3–3)

(Academic year)

Staff

47 **Beginning German for Reading Examination Candidates** (0)

Specifically for graduate students with little or no German who are preparing for reading examinations. No academic credit. Tuition fee, $25. (Fall and spring)

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* With permission of instructor, Germ 9-10 may be taken concurrently with Germ 4.

49 **German Readings for Nonmajor Students** (3) Staff

Primarily for graduate students preparing for reading examinations, undergraduates admitted. No academic credit for graduate students. Prerequisite: Germ 4 or 47, or equivalent. (Fall and spring)

51–52 **Introduction to German Literature** (3–3) Staff

Lecture, recitation, and discussion in English. Selected readings in German literature from the earliest periods to the present. (Academic year)

SECOND GROUP

103–4 **Major Themes of German Literature—in English** (3–3) Thoenelt

(Formerly "Faust" and "Wilhelm Meister")

Content differs each time the course is offered; may be repeated for credit. Lecture and discussion. Selected works of Goethe, Thomas Mann, Hesse, Böll, and others. Topics for 1974-75: Germ 103—The "Faust" theme in German thought and civilization, from Goethe to Thomas Mann; Germ 104—The "Wilhelm Meister" theme in German thought and civilization, from Goethe to Böll. (Academic year 1974-75 and alternate years)

111–12 **Comparative Studies in Germanic Literatures—in English** (3–3) Thoenelt

Content differs each time the course is offered; may be repeated for credit. Lecture and discussion. Topics for 1973-74: Germ 111—Absurdity and rebellion, loss and rediscovery of the self, from Existentialism back to Enlightenment, selected works of Thomas Mann, Böll, Frisch, Hesse, Strindberg, Goethe, and others; Germ 112—Individualism in German thought and civilization; the meaning of truth in education and self-realization as reflected in German 18th and 20th century literature, selected works of Goethe, Novalis, Thomas Mann, Böll, and others. (Academic year 1973-74 and alternate years)

131–32 **18th Century German Literature** (3–3) Thoenelt

Enlightenment, Storm and Stress, Classicism. (Academic year 1973–74 and alternate years)

141–42 **19th Century German Literature** (3–3) Steiner

Romanticism, Biedermeier, Young Germany, Realism. (Academic year 1974–75 and alternate years)

151–52 **20th Century German Literature** (3–3) Steiner

The age of Nietzsche, Naturalism, Impressionism, Expressionism; Kafka, Thomas Mann, Hesse; émigré literature, contemporary drama; authors of Gruppe 47. (Academic year 1973–74 and alternate years)

161–62 **Studies in Modern German Literature** (3–3) Steiner

Content differs each time the course is offered; may be repeated for credit. Readings of representative writers of modern German prose; lecture and discussion in English. (Academic year 1974–75 and alternate years)

179–80 **Advanced Conversation and Composition** (3–3) Thoenelt

Discussions and compositions on literary and cultural topics, readings of newspaper articles, interpretations of selected texts (Gottfried Benn and Thomas Mann), grammar and style studies. (Academic year 1974-75 and alternate years)

THIRD GROUP

201–2 **Middle High German** (3–3) King
(Academic year 1973–74 and alternate years)

209–10 **Old High German** (3–3) King
(Academic year 1974–75 and alternate years)

211–12 **History of the German Language** (3–3) King
(Academic year 1974–75 and alternate years)

213–14 **Old Norse** (3–3) Allen
(Academic year 1973–74 and alternate years)

225–26 **Seminar: Linguistics** (3–3) King, Allen
Bibliography, methodology, readings, and research problems.

231–32 **German Classicism** (3–3) Thoeneb
Advanced study and critique of the classical literature of the Goethe era. Prerequisite: Germ 131–32 or equivalent. (Academic year 1974–75 and alternate years)

251–52 **Seminar: Studies in 20th Century German Literature** (3–3) Steiner
Special projects in fiction, drama, poetry, and criticism. (Academic year 1974–75 and alternate years)

271–72 **Seminar: German Realism** (3–3) Steiner
Analysis of authors, works, genres, and literary trends. Topic for 1973–74: the drama of German Realism. (Academic year 1973–74 and alternate years)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

SANSKRIT

SECOND GROUP

105–6 **First-year Sanskrit** (3–3) King
(*Formerly Germ 227 Sanskrit—Introduction to Indo-European Linguistics (3)*)
A year course: credit toward a degree at this University given on completion of Germ 106. Language, literature, and culture of ancient India. Essentials of grammar; reading of classical and Vedic texts. Aural-oral practice in language laboratory. Laboratory fee, $17.50 a semester. (Academic year)

107–8 **Second-year Sanskrit** (3–3) King
(*Formerly Germ 228 Sanskrit—Introduction to Indo-European Linguistics (3)*)
A year course: credit toward a degree at this University given on completion of Germ 108. Language, literature, and culture of ancient India. Continuation and review of grammar; reading of more difficult classical

and Vedic texts. Aural-oral practice in language laboratory. Prerequisite: Germ 105–6 or equivalent. Laboratory fee, $17.50 a semester. (Academic year)

Greek

See "Classics."

Health Care Administration

Professors Leon Gintzig (*Chairman*), Louis Block (*Visiting*)
Professorial Lecturers M.J. Taves, H.L. Hirsh
Associate Professors R.R. Bonato (*Research*), G.E. Morris, M.C. Devolites, P.N. Reeves
Adjunct Associate Professor Nina Woodside
Associate Professorial Lecturers W.A. Parker, C.R. Hayman
Assistant Professor W.H. Guy (*Research*)
Assistant Professorial Lecturers H.R. Wertlieb, Sami Khoury
Instructors Patricia Cleary (*Research*), Richard Switalski (*Research*), R.G. Shouldice, D.F. Bergwall
Lecturers T.L. Schmidt, A.L. Braun, Loretta Nolan, H.P. Solomon

Programs of study in Health Care Administration leading to the degrees of *Master of Arts in Health Care Administration, Master of Business Administration, Master of Public Administration, Post-Master's Graduate Certificate in Health Care Administration, Doctor of Business Administration,* and *Doctor of Public Administration* are offered by the School of Government and Business Administration (see pages 31–61).

SECOND GROUP

153–54 **Survey of Health Care Organization and Procedures** (3–3) Parker, Nolan

Introduction to the history, concepts, and activities of health care systems in this country. Emphasis on organization and procedures. Prerequisite to HCA 154: HCA 153 or permission of instructor. Not open to Master's degree candidates in Health Care Administration. (Academic year)

THIRD GROUP

202 **Introduction to Health Care** (3) Woodside, Khoury, Hayman, Bergwall

Lecture and discussion (2 hours), laboratory (2 hours). Survey of organization, functions, trends, and issues among governmental, nongovernmental, voluntary sectors; survey of major diseases by organ systems and their impact on administration and planning; medical terminology. (Fall and spring)

203 **Health Care Organization and Management** (3) Parker, Devo
Lecture and discussion (2 hours), laboratory (2 hours). History current character of institutional health care. Organizational func and structure of various kinds of health care facilities. Prerequisit concurrent registration: Mgt 201. (Fall and spring)

204 **Management of Health Maintenance Organizations** (3) Shoul
(Formerly Planning and Support Agencies and Associations)
Basic principles and fundamentals of prepaid group practice plans newly forming health maintenance organizations. Emphasis on plann development, and operation of prepaid plans. (Fall)

205 **Hospital Management Procedures** (3) Parker, No
Lecture and discussion (2 hours), laboratory (2 hours). Departmen administration. Survey of hospital law; hospital forms, procedures, systems; and hospital programs pertaining to disaster relief, safety, prevention. (Fall and spring)

206 **Case Studies in Health Care Administration** (3) Devoli
Discussion (2 hours), laboratory (2 hours). General ideas about admi istration applied to practical cases. Emphasis on policy-making, plannin controlling, and organizing. Prerequisite: HCA 203 and Mgt 201. (Fall and spring)

207 **Management Analysis in Health Care Institutions** (3) Shouldc
Lecture (2 hours), laboratory (2 hours). Basic investigation and prob lem-solving techniques, including various methods of collecting, analyzing reporting, and using information that can be made available to admin istrators of hospitals and other medical care institutions. (Fall an spring)

209 **Health Care Economics and Financial Management** (3) Block
Lecture (2 hours), laboratory (2 hours). Economic and financial analysi of the interactions between consumers and providers of health care, an public and private prepayment and insurance programs. Industry pric structure and the long- and short-term capital requirements. (Fall an spring)

210 **Advanced Financial Management of Health Care Institutions** (3) Block and Staff
Nature and interpretation of health care institution financial repor Techniques of financial planning and control; operation of third-party reimbursement contracts; capital needs, planning, and acquisition; case studies, field research. Prerequisite: HCA 209. (Fall or spring)

212 **Health Project Planning** (3) Reeves, Schmidt, Braun, Bergwall
Lecture (2 hours), laboratory (2 hours). Basic health planning method and procedures for those students engaged in planning a specific facility or service. Prerequisite: HCA 202 and 203. (Fall and spring)

213 **Administration of Health Care Systems** (3) Ginzb
Comparative evaluation of various organizational patterns, functions, and trends in health care systems. Emphasis on the sources of such differences and significance of the systems to the health care of a nation. (Fa or spring)

214 **Health Systems Planning** (3) Reeves, Bergwall

Advanced health planning for those students concerned with development of health systems; emphasis on the legal, political, social, and economic factors influencing health planning. Prerequisite: HCA 212. (Fall or spring)

215 **Practicum in Health Project Planning** (3) Reeves, Woodside

Supervised practical instruction in agencies doing comprehensive health planning; emphasis on basic investigation and problem-solving techniques, including various methods of collecting, analyzing, and reporting data. Prerequisite: HCA 212. (Fall or spring)

216 **Seminar: Health Systems Planning** (3) Reeves and Staff

An analysis of the effect of legal, political, social, and economic factors on the planning of health systems. This analysis will be conducted through the use of games and simulation models. Prerequisite: HCA 214 and 215. (Fall or spring)

250 **Delivery of Mental Health Services** (3) Morris

(*Formerly Mental Health Facilities and Resources*)

Study of the organizations and systems for the delivery of mental health services; emphasis on administration, management, and financial support of treatment and rehabilitation facilities.

260 **Seminar: Administration for Long-term Care** (3) Wertlieb

Comparative evaluation of characteristics of long-term care institutions, e.g., extended care, skilled nursing homes, homes and housing for the aged, etc.; relation of the purposes and functions of these institutions to the total health needs of the community. (Fall)

261 **Seminar: Administration for Long-term Care Institutions** (3) Wertlieb

Designed to improve the ability and effectiveness of health administrators through a foundation of knowledge and skills in health facility organization and management. Emphasis on range of services available in long-term care institutions.

265–66 **Readings in Long-term Care Administration** (3–3) Staff

Advanced studies in selected aspects of administration of long-term care facilities, including nursing homes, homes for the aged, and others. (Fall or spring)

267 **Social Gerontology for the Administrator** (3) Taves

Special characteristics of the elderly with which administrators of long-term care facilities should be acquainted. (Fall and spring)

270 **Research in Health Care Administration** (3) Gintzig, Reeves, Solomon

Field research. Primarily for doctoral students; open to other graduate students with consent of instructor. May be repeated for credit. (Fall or spring)

285–86 **Readings in Health Care Administration** (3–3) Staff

Supervised readings in some special areas or subdivisions of health care administration. Primarily for doctoral students; open to other students by arrangement. (Academic year)

287 **Seminar: Integration of Health Care Administration** (3)
Primarily for doctoral students; open to other students by arrange
May be repeated once for credit. (Fall)

288 **Seminar: Field Problem Studies in Health Care Administration** (3) Reeves, Gi
Selected administrative and planning issues and problems arising in h
care facility situations. Primarily for doctoral students; open to other
dents by arrangement. May be repeated for credit. (Fall or spr

293–94
–95 **Residency I** (3–3–3)
Twelve-month residency, beginning June 1 or July 1. Work experi
under a qualified preceptor, periodic written progress reports, an
written major report.

296–97
–98 **Residency II** (3–3–3) Gint
For selected students who take a second twelve-month residency; beg
June 1 or July 1.

299–300 **Thesis Research** (3–3) S
(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Gintzig, Reev
Limited to doctoral students preparing for the general examination. M
be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Gintzig, Reev
Limited to doctoral candidates. May be repeated for credit. (Fall
spring)

Hebrew

See "Classics."

History

Professors R.H. Davison, R.B. Thompson, F.H. Michael, R.C. Haskett, R
Sharkey, H.M. Sachar, R.W. Kenny (*Chairman*)
Adjunct Professors R.P. Multhauf, Frederick Gutheim
Associate Professors C.J. Herber, P.P. Hill, W.R. Johnson, Lois Schwoer
Linda DePauw, Richard Thornton, Letitia Brown
Associate Professorial Lecturer Horia Socianu
Assistant Professors A.D. Andrews II, R.A. Hadley, S.A. Grant, P.F. Klu
L.P. Ribuffo

Bachelor of Arts with a major in History (Field-of-Study).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Humanities and the Natural and Mathematical Sciences.)

2. Prerequisite courses—Hist 39–40 or 91–92, and 71–72; or equivalent.

3. Required courses in related areas—(a) either 12 semester hours of one introductory foreign language (French, German, Greek, Hebrew, Italian, Latin, Russian, or Spanish, or another approved language relevant to the student's program); or (b) 12 semester hours of Statistics (Stat 53 or 104; Stat 97; 105; and one course selected from Stat 131, 159, 188).

4. The passing of the History major examination in the senior year.

The major, and the major examination which attests it, is centered on the study of the Mediterranean rise, European development, and trans-Atlantic spread of Western civilization, its interaction with other civilizations in a world context, and its continuing challenges to the present day. Under the guidance of an adviser the student will arrange his program in History to attain, insofar as possible, a balanced evaluation of (1) the rise of civilization in Europe from its classical origins to the eve of the French Revolution; (2) the historic problems of modern Europe in the age of industry and ideology since 1789; (3) the political, social, economic, and cultural forces of the United States in their world setting since 1607; and (4) the nature and development of civilization in the principal areas outside of the North Atlantic community. Two 3-hour seminars, at least one of which must be research, are required as a part of each major's program (except Honors Program, see below). A required proseminar (Hist 199) is a means of integrating the student's understanding of the continuity of Western civilization in its world context. A pamphlet relating to the major is available in the offices of the Dean of Columbian College of Arts and Sciences and the Department of History.

An Honors Program may be chosen by juniors with satisfactory scholastic records. Application to this Program must be made shortly before completion of the first semester of the junior year. Students accepted into the Program take a 3-hour research seminar in the second semester of the junior year and complete the research requirements for the history major by preparing the Senior Honors Thesis (Hist 91–92) in the final year of undergraduate study. A special proseminar section is offered for Honors Program students in the first semester of the senior year.

Master of Arts in the field of Classical Archaeology, Classics, and History (an interdepartmental degree program offered by the departments of Art, Classics, and History).—Prerequisite: a Bachelor's degree with a background in Classical Archaeology and either Greek or Latin. Applicants from other institutions must present scores on the Graduate Record Examination to the Office of the Graduate School of Arts and Sciences.

Required: the general requirements, pages 92–99. The program of study consists of 24 semester hours of course work (as many as possible should be third-group courses) selected in consultation with the appropriate adviser from the departments of Art, Classics, and History; plus a thesis (equivalent to 6 additional semester hours). Candidates must pass a reading knowledge examination in French or German. All candidates are required to pass a general Master's Comprehensive Examination.

Master of Arts in the field of History.—Prerequisite: a Bachelor's degree from an accredited college or university with a major in history, or an equivalent degree; good scholastic standing; and approval of the Department. Applicants from other institutions must present scores on the Graduate Record Examination with the Advanced Test in History and arrange for four persons, preferably former instructors, to send letters or reference forms to the Office of the Graduate School of Arts and Sciences.

Required: the general requirements, pages 92–99. Candidates must complete either (1) a minimum of 30 semester hours of second- and third-group courses, including Hist 299–300 *Thesis Research*, or (2) a minimum of 36 semester hours of second- and third-group courses, including at least two research seminars (6 semester hours). At least 6 semester hours of each candidate's program must be in third- or fourth-group History courses; a maximum of 6 may be in approved courses outside the Department of History. Master's candidates are responsible for arrangements with instructors of second-group courses for extra work, in order to receive graduate credit for such courses. Each student works in two fields of history.

Doctor of Philosophy in the field of History.—Required: the general requirements, pages 92–96, 99–101, including the passing of a written examination in two foreign languages, normally French and German, and the satisfactory completion of the General Examination in four fields. Normally, each doctoral candidate will work in one major (or general) field of study and three special fields. The major fields include the following: Ancient History, Medieval Europe, Early Modern Europe, Modern Europe, United States, Latin America, Modern Near East, Modern Far East, Russia and East Europe. Special fields may vary from the topical (e.g., U.S. Social History, European Intellectual History, etc.) to the chronologically limited fields (e.g., American Colonial History, Tudor and Stuart England, etc.). A student may elect one special field outside of the Department of History if it is relevant to his program.

Bachelor of Arts in Education with a teaching field in History.—Prerequisite: the Education curriculum, page 78.

Required: the History option and the professional courses on pages 114–15, 119.

Doctor of Philosophy fields of study in International Relations combine work in Economics, History, and Political Science.

Departmental prerequisite: Hist 39–40 or 91–92 is prerequisite to courses 101 through 158 and 187 through 196; Hist 71–72, to courses 167 through 186; either Hist 39–40, 71–72, or 91–92, to courses 161 through 166. Prerequisite to Hist 105–6 is either Hist 39–40, 91–92, or a background in a science. Students may waive one or more of the prerequisite courses by passing a departmental waiver examination, by attaining scores of 600 or above on the College Entrance Examination Board Achievement tests, or by good performance on Advanced Placement Examinations.

FIRST GROUP

39–40 **European Civilization in Its World Context** (3–3)

Hist 39: political, social, economic, and cultural history to early modern era. Hist 40: from early modern era to present. Students who receive credit for Hist 39–40 cannot receive credit for Hist 91–92. (Academic year)

71–72 **Introduction to American History** (3–3)

Hist 71: political, social, economic, and cultural forces of the United States in their world setting from 1492 to 1861. Hist 72: from 1861 to present. (Academic year)

91–92 **World Civilizations** (3–3)

Hist 91: major civilizations of the world to 1500. Hist 92: Europocentric and world civilization since 1500. Students who receive credit for Hist 91–12 cannot receive credit for Hist 39–40.

SECOND GROUP

105–6 **History of Science** (3–3) Multhauf

Hist 105: from ancient natural philosophy through the 17th century scientific revolution. Hist 106: scientific development from the 18th to the early 20th century. (Academic year)

108 **The Ancient Near East and Egypt to 600 A.D.** (3) Hadley

Survey of Egyptian, Mesopotamian, Anatolian, West Semitic, and Iranian civilizations from the Neolithic period to the Islamic conquest.

109 **Early Aegean and Greek Civilizations to 200 B.C.** (3) Hadley

Neolithic background: Bronze age—Minoan, Helladic, and Mycenaean civilizations; classical Greek civilization to the eve of the Roman conquest. (Fall)

110 **The Roman World to 455 A.D.** (3) Hadley

Prehistoric Italy; rise and decline of the Roman Empire and Latin civilization; cultural, social, and political developments in the Greek world under Roman rule. (Spring)

111–12 **Medieval History** (3–3) Andrews

Development of the Latin Christian community. Hist 111: 4th to 11th century. Hist 112: 11th to 13th century. (Academic year)

113 **Early Middle Ages** (3) Andrews

Mediterranean region from 4th to 11th century; emphasis on Byzantium.

116 **History of Africa** (3)

Survey of political, cultural, and economic development from ancient times to the present.

121 **The Renaissance in Western Europe** (3) Schwoerer

Political, economic, intellectual, and cultural features of the Renaissance (14th–16th centuries). Focus on Italy, but with attention to developments in France and England.

*127 **Theories of History** (3) Lavine

Critiques of philosophies of history: idea of progress, historicism, Hegelian-Marxian dialectic, cyclical and social-scientific views. Contemporary problems of historical knowledge. (Fall)

131–32 **History of Germany** (3–3) Herber

Political, social, and cultural development. Hist 131: from Reformation to unification. Hist 132: from unification to present.

138 **History of World Communism** (3) Thornton

The international communist movement from its beginnings to the present. (Spring)

139–40 **World History in the 20th Century** (3–3) Sachar

Diplomatic, political, and cultural factors. Hist 139: from the turn of

* An interdepartmental course offered by the departments of History and Philosophy.

the century to the Munich settlement of 1938. Hist 140: from the Munich settlement to present. (Academic year)

141–42 **History of France** (3–3)
Political, social, and cultural development. Hist 141: from earliest times to Napoleon. Hist 142: from Napoleon to present.

143 **History of Eastern Europe** (3)
Poland, the Danube countries, and the Balkans in the 19th and 20th centuries. (Fall)

144 **History of Russia: Medieval to 1700** (3)
Russian history to the reign of Peter the Great. (Fall)

145 **History of Russia: 18th and 19th Centuries** (3)
From the reign of Peter the Great to the Russian Revolution.

146 **History of Russia: Soviet Russia** (3)
Revolution and Soviet rule to the present. (Fall)

*147 **Economic History of Europe** (3)
Economic development since the Middle Ages; emphasis on the period following the Industrial Revolution. Evolution of capitalism and its impact upon the societies of Europe. (Spring)

149–50 **European Diplomatic History** (3–3)
Emphasis on policies and actions of the great powers and their statesmen. Hist 149: to 1890. Hist 150: since 1890. Students who receive credit for Hist 150 cannot receive credit for Hist 157. (Academic year)

151–52 **History of England and Great Britain** (3–3)
Development of English civilization and its impact on Western culture. Hist 151: to 1689. Hist 152: since 1689. (Academic year)

153 **Tudor England** (3)
Aspects of the constitutional, social, intellectual, and religious development of England, 1485–1603.

154 **Stuart England** (3)
Main currents from 1603 to 1714; emphasis on political, religious, social, and intellectual developments. (Spring)

157 **20th Century European Diplomatic History** (3)
The main currents, with necessary 19th century background. Students who receive credit for Hist 157 cannot receive credit for Hist 150. (Fall)

158 **Modern Jewish History** (3)
A secular history of the Jewish people from the 18th century to the present state of Israel, with particular emphasis on European political, economic, and cultural influences. (Spring)

* An interdepartmental course offered by the departments of History and Economics.

161 **Revolution in 20th Century Latin America: the Mexican and Cuban Experience** (3) Klarén

Social, economic, and political forces working to undermine the traditional fabric of Latin American society; emphasis on historical roots of revolutionary movements. (Spring)

163–64 **History of Latin America** (3–3) Klarén

Political, social, and cultural development. Hist 163: through independence. Hist 164: the national period. (Academic year)

165 **History of Brazil** (3) Staff

Political, social, and cultural aspects.

166 **History of Mexico** (3) Klarén

Political, social, and cultural aspects. (Fall)

167 **American Colonial History** (3) Haskett

Settlement of colonies, development of provincial institutions, and emergence of American civilization in the 17th and 18th centuries. (Spring)

169 **The American Revolution** (3) DePauw

The crisis of the British Empire after the Seven Years War, the War for Independence, the Confederation period, the making and ratification of the Federal Constitution. (Fall)

170 **U.S. Early National History** (3) Hill

Political, diplomatic, economic, and social history of the early republic, 1789–1828. (Fall)

171–72 **U.S. Social History** (3–3)

Hist 171: daily life, institutions, intellectual and artistic achievements of the Agrarian Era, 1607–1861. Hist 172: the Urban-Industrial Era from 1861 to present.

173–74 **The Negro in American History** (3–3) Brown

The place of Black Americans in the corpus of American history. (Academic year)

175–76 **U.S. Political History** (3–3) Haskett

Hist 175: to the Civil War. Hist 176: Civil War to New Deal. (Academic year)

177 **The Ante-bellum South** (3) DePauw

Development of the South as a section in the ante-bellum period. (Spring)

*179–80 **U.S. Economic History** (3–3) Sharkey

Process of economic growth from Colonial times to the present. Development of various sectors in the economy and their interdependence. Hist 179: 1607–1865. Hist 180: from 1865 to present. (Academic year)

* An interdepartmental course offered by the departments of History and Economics.

Hill

181–82 **U.S. Diplomatic History** (3–3)
Survey of American foreign relations from the era of the American Revolution. Hist 181: to 1898. Hist 182: 20th century. (Academic year)

Staff

183 **Oversea Expansion of the United States** (3)
Political, economic, social, and cultural life of our outlying possessions.

Staff

184 **Canada and the United States** (3)
Historical background and main trends in the relationship of the two English-speaking peoples of North America.

Staff

185 **Representative Americans** (3)
Significant and pivotal personalities in government, business, science, religion, journalism, the arts, and social reform.

Gutheim

186 **U.S. Urban History** (3)
Development and characteristics of American cities. (Fall)

Johnson

187 **History of Modern China** (3)
China since 1840, particular attention to political developments. (Fall)

Thornton

188 **History of Chinese Communism** (3)
Survey of the leadership, ideology, structure, and operation of the Communist Party of China from its founding to the present. (Fall)

Sigur

189 **History of Modern Japan** (3)
(Fall)

Staff

191–92 **Senior Honors Thesis** (3–3)
Required of and open only to undergraduate honors candidates in history. (Academic year)

Davison

193 **History of the Near East** (3)
Byzantine, Arab, Persian, and Islamic backgrounds; rise and decline of the Ottoman Empire; action of European powers in the area; Ottoman breakup into the Turkish Republic and other states. (Fall)

Davison, Sachar

194 **History of the Modern Near East** (3)
Beginning with Napoleon's invasion of Egypt. Interaction of Europe with western Asia, emphasis on the Turkish Straits, Suez, Anglo-French imperialism; Turkish, Balkan, Arab, and Jewish nationalism, and the recent Soviet intrusion.

Johnson

195–96 **History of East Asia** (3–3)
Civilizations of China and Japan; emphasis on institutional development. Hist 195: beginnings to about 1800. Hist 196: from eve of the modern era to present. (Academic year)

Staff

199 **Proseminar: Readings for the History Major** (3)
Required of senior history majors. Readings and discussions on major trends in history; representative selections from the classics of historical literature. Students who receive credit for Hist 199 cannot receive credit for Hist 201. (Fall and spring)

THIRD GROUP

Prerequisite to all third-group History courses: the appropriate second-group preparation and consent of instructor.

201 **History and Historians** (3) Staff

Students who receive credit for Hist 201 cannot receive credit for Hist 199. (Fall and spring)

203–4 **Research Seminar** (3–3) Staff

Prerequisite: approval of Department. (Academic year)

205–6 **Seminar: Modern History of Eastern Europe** (3–3) Petrov

East Central and Southeastern Europe in the 19th and 20th centuries. Hist 205: to the mid-1930's. Hist 206: to the communist take-over (1948). (Academic year)

207 **Seminar: the Communist Party of the Soviet Union** (3) Grant

Evolution of the communist movement in Russia. Party congresses, Comintern, Cominform, and other fundamentals of international communist organization. (Spring)

208 **Research Seminar: History of World Communism** (3) Thornton

209–10 **Seminar: Ancient History** (3–3) Hadley

Prerequisite: Hist 108, 109, or 110; or equivalent. (Academic year)

211–12 **Seminar: Medieval History** (3–3) Andrews

Prerequisite: Hist 111–12 or equivalent. (Academic year)

215–16 **Junior Seminar** (3–3) Staff

Primarily for juniors. Study and discussion of selected topics. Admission by permission of instructor. (Academic year)

217–18 **Seminar: Russian and Soviet Thought** (3–3) Grant

(Academic year)

*231 **Seminar: Sino-Soviet Relations** (3) Michael

Background, development, and status of conflict within the communist movement; emphasis on the role of Chinese communists. Prerequisite: 3 semester hours selected from Hist 187; P Sc 101, 194; or equivalent. (Spring)

237 **Seminar: Soviet Foreign Policy, 1917–1953** (3) Petrov

Revolutionary concept of diplomacy. Parallel instruments of foreign policy during era of "capitalist encirclement," 1917–1939. From Nazi-Soviet partnership to the alliance with the West. Foreign policies of the cold war. (Fall)

241–42 **Research Seminar: Modern European History** (3–3) Herber

Prerequisite: appropriate preparation and consent of instructor.

245–46 **Research Seminar: Revolutionary Russia** (3–3) Thompson

(*Formerly Research Seminar: Russian History*)

Hist 245: roots of the Revolution, 1840–1917. Hist 246: stages of the

* An interdepartmental course offered by the departments of History and Political Science.

Revolution, 1917–1940. Prerequisite: Hist 145, 146; or equivalent. (Academic year)

247 **Research Seminar: the Theory and Practice of Modern Imperialism** (3) Sharkey
(Fall)

248 **Reading Seminar: Modern European and Near Eastern History** (3)
Admission by permission of instructor.

249–50 **Research Seminar: European Diplomatic History** (3–3) Davison
Prerequisite: Hist 149 or 150 or equivalent. Reading knowledge of French or German required. (Hist 249—fall)

251–52 **Research Seminar: English History** (3–3) Kenny, Schwoerer
Prerequisite: Hist 151–52 or equivalent. (Academic year)

261–62 **Research Seminar: Latin American History** (3–3) Klarén
Prerequisite: 6 semester hours of undergraduate course work in Latin American History. (Academic year)

271–72 **Research Seminar: U.S. Social History** (3–3)
Prerequisite: Hist 171–72 or equivalent.

*273–74 **Research Seminar: Materials in American Negro Culture** (3–3) Brown
Prerequisite: Hist 173–74 or equivalent. (Academic year 1973–74 and alternate years)

275–76 **Research Seminar: U.S. Political History** (3–3) Haskell
Prerequisite: Hist 175–76 or equivalent. (Academic year)

278 **Research Seminar: American History** (3) Hill
Admission by permission of instructor.

281–82 **Research Seminar: U.S. Diplomatic History** (3–3) Hill
Prerequisite: Hist 181–82 or equivalent. (Academic year)

283–84 **Research Seminar: Recent U.S. History** (3–3)
Prerequisite: 6 semester hours of 100-level American History courses. (Hist 283—fall)

285–86 **Research Seminar: Early American History, 1607–1828** (3–3) Hill, DePauw
Prerequisite: Hist 170, 175, or 181; or equivalent.

287 **Seminar: Problems in Latin American Civilization** (3) Gordon
Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. Admission by permission of instructor. (Spring)

288 **Research Seminar: History of Chinese Communism** (3) Thornton
(Spring)

* Offered jointly by the Department of History and the American Studies Program.

289 **Seminar: Modern Japanese History** (3) Thornton
Research and writing seminar on selected topics in modern Japanese history from the Meiji restoration 1868 to the present. (Spring)

291 **Research Seminar: 20th Century Problems—Era of World War I** (3) Sachar
(Fall)

292 **Research Seminar: 20th Century Problems—Era of World War II** (3) Sachar
(Spring)

293–94 **Research Seminar: the Modern Near East** (3–3) Davison
Prerequisite: Hist 193 or equivalent. (Hist 294—spring)

295–96 **Research Seminar: the Modern Far East** (3–3) Johnson
Prerequisite: Hist 195–96 or equivalent.

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

Prerequisite to all fourth-group History courses: the appropriate second-group preparation and consent of instructor.

Fourth-group History courses are limited to graduate students; but they are primarily for doctoral students.

311–12 **Readings in Medieval History** (3–3) Andrews
(Hist 312—spring)

341–42 **Readings in Modern European History** (3–3) Davison
(Hist 342—spring)

345–46 **Readings in Russian History** (3–3) Thompson

351–52 **Readings in English History** (3–3) Schwoerer, Kenny

361–62 **Readings in Latin American History** (3–3) Klarén

371–72 **Readings in American Social History** (3–3)

*373–74 **Readings on the Negro in American Culture** (3–3) Brown
(Academic year 1974–75 and alternate years)

375–76 **Readings in U.S. Political History** (3–3) Haskett
(Hist 376—fall)

†379–80 **Readings in Economic History** (3–3) Sharkey
Hist 379: American economic history. Hist 380: modern European economic history. (Academic year)

*Offered jointly by the Department of History and the American Studies Program.
†An interdepartmental course offered by the departments of History and Economics.

381–82 **Readings in American Diplomatic History** (3–3) Staf
(Hist 382—fall)

385–86 **Readings in Early U.S. History** (3–3) DePau
(Hist 386—fall)

387–88 **Readings in the History of Sino-Soviet Relations** (3–3) Thornto
(Hist 388—fall)

395–96 **Readings in Modern Far Eastern History** (3–3) Johnso

398 **Advanced Reading and Research** (arr.) Staf
Limited to students preparing for the Doctor of Philosophy general e
amination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staf
Limited to Doctor of Philosophy candidates. May be repeated for credi
(Fall and spring)

Honors Program—Columbian College

H.E. Yeide, Jr., *Coordinator*

Limited to selected sophomores (see page 70).

FIRST GROUP

1 **Seminar: the Great Ideas of the West** (3)
Reading, discussion, and research involving works crucial to an unde
standing of the great Western ideas—their historical development an
contemporary relevance. Examination of problems and categories that l
at the roots of most modern scholarly disciplines. (Fall)

21–22 **Seminar: Contemporary Problems** (3–3)
Reading, discussion, and research dealing with one major contempora
problem each semester, utilizing the perspectives and insights of variou
academic disciplines. (Academic year)

23 **Independent Honors Study** (3)
Admission by prior approval of Honors Program Advisory Committee
A major study project supervised by a faculty member. A significa
paper or report required. (Spring)

Institute for Sino-Soviet Studies

MEMBERS OF THE INSTITUTE

Gaston Sigur (*Director*), C.F. Elliott, S.A. Grant, Andrew Gyorgy, H.C. Ha
ton, W.R. Johnson, C.A. Linden, F.H. Michael, C.A. Moser, Vladimir Petro
Chung-wen Shih, R.B. Thompson, Richard Thornton, R.Y.C. Yin

ASSOCIATE MEMBERS OF THE INSTITUTE

Joseph Baclawski, Eleanor Hadley, Abraham Halpern, John Hardt, Tao-tai Hsia, Bernard Ramundo, Philip True, R.K. White, T.W. Wolfe

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The Institute for Sino-Soviet Studies offers specialized graduate study in the School of Public and International Affairs. Students who lack background in Soviet and East Asian studies are required to take undergraduate courses selected by the adviser as prerequisite to graduate work. Related preparatory undergraduate courses include the following: Econ 101, 102, 133, 134, 169, 170; Hist 138, 143, 144, 145, 146, 187, 188, 189, 195–96; P Sc 5, 101, 112, 115, 160, 162, 163, 193, 194; Psyc 151.

For description of the objectives and programs of the Institute, see pages 176–77.

For descriptions of the courses listed below, see the appropriate departmental listing.

ECONOMICS

267 *Seminar: Soviet Economy* (3)	Hardt
268 *Seminar: Economic Theory and Development in Communist Countries* (3)	Hardt
269 *Economy of Communist China I* (3)	Yin
270 *Economy of Communist China II* (3)	Yin
271 *Economy of Japan* (3)	Hadley

GEOGRAPHY AND REGIONAL SCIENCE

265 *Seminar: Geography of the Soviet Union* (3)	Baclawski
266 *Seminar: Geography of China* (3)	True

HISTORY

205–6 *Seminar: Modern History of Eastern Europe* (3–3)	Petrov
207 *Seminar: the Communist Party of the Soviet Union* (3)	Grant
208 *Research Seminar: History of World Communism* (3)	Thornton
217–18 *Seminar: Russian and Soviet Thought* (3–3)	Grant
231 *Seminar: Sino-Soviet Relations* (3)	Michael
237 *Seminar: Soviet Foreign Policy, 1917-1953* (3)	Petrov
245–46 *Research Seminar: Revolutionary Russia* (3–3)	Thompson
288 *Research Seminar: History of Chinese Communism* (3)	Thornton
289 *Seminar: Modern Japanese History* (3)	Sigur
295–96 *Research Seminar: the Modern Far East* (3–3)	Johnson
345–46 *Readings in Russian History* (3–3)	Thompson
387–88 *Readings in the History of Sino-Soviet Relations* (3–3)	Thornton
395–96 *Readings in Modern Far Eastern History* (3–3)	Johnson

POLITICAL SCIENCE

213–14 *Comparative Communist Systems* (3–3)	Linden
215–16 *Seminar: the Communist Camp in World Politics* (3–3)	Staff
224 *Readings in Socialism and Communism* (3)	Elliott, Linden
227 *Seminar: Governments and Politics of Eastern Europe* (3)	Gyorgy
229 *Readings in Soviet Government and Politics* (3)	Elliott, Linden

231 *Seminar: Sino-Soviet Relations* (3) Michael
232 *Seminar: International Communications* (3) Staff
233 *Seminar: Soviet Government and Politics* (3) Elliott, Linder
237 *Chinese Law* (3) Hsia
238 *Soviet Law* (3) Ramundo
253 *Seminar: Chinese Government and Politics* (3) Michael
254 *Colloquium: East Asia* (3) Michael
255 *Colloquium: Russia and Eastern Europe* (3) Gyorgy
257–58 *Seminar: Communism in Developing Countries* (3–3) Staff
265–66 *Chinese Communist Policy Processes* (3–3) Hinton
269 *Seminar: Soviet Foreign Policy* (3) Elliott
270 *Political and Social Institutions of Eastern Europe* (3) Gyorgy
274 *Principles and Problems of International Political Communication* (3) Staff
288 *Seminar: Soviet Military Policy and Strategy* (3) Wolf
294 *Seminar: Governments and Politics of Japan and Korea* (3) Halper
295 *Seminar: Chinese Communist Foreign Policy* (3) Hinton
296 *The Communist Role in Far Eastern International Politics* (3) Hinton
298 *Southeast Asia in World Politics* (3) Staff
325 *Research Seminar: Topics in Marxism-Leninism* (3) Elliott, Linder

PSYCHOLOGY

259 *Seminar: Social Psychology of Communism* (3) White

International Affairs

See "Public and International Affairs."

Italian

See "Romance Languages and Literatures."

Japanese

See "East Asian Languages and Literatures."

Journalism

Professorial Lecturers F.L. Dennis, H.L. Coppenbarger
Associate Professors R.C. Willson (*Chairman*), Philip Robbins

Associate Professorial Lecturers Peter Weaver, C.W. Puffenbarger, H.E. Paine, O.L. Mazzatenta, Peter Silberman
Assistant Professorial Lecturers R.L. Courage, George Cheely, J.P. McGill, Clare Crawford, Elie Rogers

Bachelor of Arts with a major in Journalism (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students planning to major in Journalism should take Engl 4 rather than Engl 2 in satisfying the English composition requirement.)
2. Prerequisite courses—Engl 51–52 or 71–72; Jour 71–72; P Sc 4 and 6 or 5 and 6.
3. Required courses in the major—24 hours of second-group courses in Journalism, including (a) Jour 111, 196, 198; and (b) 9 semester hours chosen from Jour 121, 133, 137, 138, 139, 151.
4. Required as a minor area of concentration—a minimum of 18 semester hours of second-group courses, chosen in consultation with the major adviser, in one other department of Columbian College of Arts and Sciences. Students electing a minor area in science may fulfill this requirement with courses in more than one department.

Departmental prerequisite: Jour 111 with a grade of *B* or better is prerequisite to Jour 125, 133, 137, 138, 139, and 196.

FIRST GROUP

71–72 **Introduction to Mass Communication** (3–3) Willson
Jour 71: evolution of newspapers and other media in relation to political, social, and economic life; concept of press freedom. Jour 72: mass media, problems of contemporary journalism, emphasis on media-government relations. (Academic year)

SECOND GROUP

111 **Reporting** (3) Robbins
Gathering, evaluating, and writing news. Laboratory fee, $5. (Fall and spring)

115 **Newspaper Editing and Make-up** (3) Coppenbarger
Preparation of news copy, pictures, and other graphic material for publication; evaluation of news; page layouts; newspaper make-up. (Spring)

116 **Magazine Layout and Design** (3) Paine
Layout, typography, and design for magazines, newsletters, house organs, and similar publications for associations, institutions, and industry. (Fall)

117 **Magazine Editing** (3)
The editor's responsibility to publisher and readers. Setting the editorial goals and planning content and production to meet them. Editing copy for general and specialized magazines.

121 **Feature Writing** (3) Willson
Free-lancing magazine articles, material obtained through independent investigation. (Fall)

125 **Science Writing** (3)
Writing science news for the mass media.

133 **Advanced Reporting: Community News** (3) Robbins
Coverage and writing of local news. (Fall)

135 **Advanced Reporting: Consumer Affairs** (3) Weaver
Specialized training in the consumer news field. (Fall)

137 **Advanced Reporting: National Affairs** (3) Silberman
Coverage and writing of federal government news from the point of view of the press association. (Spring)

138 **Investigative Reporting** (3) Weaver, Crawford, Kass
In-depth reporting in selected areas of political, economic, and social affairs. (Fall and spring)

139 **Advanced Reporting: Radio and Television News** (3) Cheely
Preparing news and public affairs programs for broadcast media. (Spring)

140 **Photojournalism** (3) Mazzatenta
Photographic techniques affecting publication, illustration and story angle standards of judgment in selection and use of pictures, captions, editing technique, cropping for effective reproduction. Laboratory fee, $25 (Spring)

141 **Advanced Photojournalism** (3) Rogers
For advanced photojournalism students who want to master skills in new photography, editing, and layout. Special emphasis on story-telling pictures picture essays, and photography in the print media. Laboratory fee, $25 Prerequisite: Jour 140 or Art 23–24. (Spring)
(Fall and spring)

145 **Principles and Problems of Public Relations** (3) McGill
Principles, problems, and ethics of public relations for government agencies, commercial establishments, educational and other public institutions Case histories of successful programs. (Fall)

146 **Government Information** (3) Courage
Growth of information activities in government and the role of the information specialist. Writing and editing for government information erations. (Spring)

150 **News Coverage in Washington** (3) Robbins
A survey of the way news is gathered and reported in the nation's capital by wire services, newspaper bureaus, and the local dailies. Field trips to major news centers; practice coverage.

151 **Editorial Writing** (3) Robbins
Techniques of editorial writing, conducting the editorial page, function editorials and columns of news commentary in a free press. (Spring

190 **Internship in Journalism** (3)

Study of a journalistic medium in action by assignment to a Washington area news office. Admission restricted to Journalism majors selected by a departmental committee. (Fall and spring)

*195 **Documentary Photography** (3) Lake and Staff

Social problems, team-taught. Each student will work on projects with social dimensions. Laboratory fee, $25. Admission by permission of instructor. Limited enrollment. (Spring)

196 **Senior Project** (3) Staff
(Formerly Seminar)

Open only to journalism majors. Major journalistic effort undertaken in consultation with a member of the Journalism staff. A written request describing the project must be presented to the staff member for approval, and filed with the student's adviser in the semester before registration. (Fall and spring)

198 **Law of the Press** (3) Dennis

Freedom of the press, censorship, legislative controls, publications as contempt of court, copyright, newsgathering agencies, labor law and the newspaper business, law of libel, privileged matter, fair comment on public characters, right of privacy. (Fall)

Latin

See "Classics."

Latin American Studies

COMMITTEE ON LATIN AMERICAN STUDIES

Marvin Gordon (*Chairman*), T.F. Carroll, H.H. Hinrichs, R.L. Humphrey, r., P.F. Klarén, J.W. Robb, F.R. Siegel, K.L. Storrs, George Stuart

Bachelor of Arts with a major in Latin American Studies (Interdepartmental).—he following requirements must be fulfilled:
1. The general requirements as stated on pages 74–75, 82–87.
2. Prerequisite courses—Anth 2, Econ 1–2, P Sc 4 or 5.
3. Required courses in related areas—Span 1–2, 3–4; or equivalent. (Span 9–10 equivalent is recommended.)
4. Required courses in the major—(a) Anth 172; Econ 185–86; Geog 161; Hist 53–64; P Sc 177, 178; and 6 semester hours chosen from Span 151–52, 155–56, 57–58, or other approved courses. (b) 18 semester hours, including an interdisolinary seminar (287) in one of the following areas: Anthropology, Economics, eography and Regional Science, Hispanic Literatures, History, or Political Science.

nterdepartmental course offered by the departments of Journalism and Art.

The required courses listed in (a) which are in the selected area may be incl
in computing the required 18 semester hours for (b).

Master of Arts in the field of Latin American Studies.—See the School of Pu
and International Affairs, pages 170–74, 175.

Candidates for the degree of Doctor of Philosophy may elect Latin American Hist
as an area of specialization in the field of History, Spanish American Literature
an area of specialization in the field of Romance Languages and Literatures,
Politics of Latin America as an area of specialization in the field of Political Scien

COURSES DEALING WITH LATIN AMERICA

Anthropology—170, 172, 184, 185, 262, 268, 272, 287
Economics—185–86, 233, 234, 285–86, 287
Geography and Regional Science—127, 161, 261, 287
History—161, 163–64, 165, 166, 261–62, 287, 361–62
Political Science—177, 178, 277–78, 287
Portuguese—31–32
Spanish—91–92, 141, 151–52, 155–56, 157–58, 197–98, 253, 255, 256, 26
264, 266, 287

Management Science

Professors R.F. Ericson, G.L. Lippitt, D.D. Roman, M.M. Wofsey, Peter Vo
Professorial Lecturers C.W. Clewlow, M.H. Schwartz, Charles Laidlaw, R.
Walther
Associate Professors J.F. McCarthy, Jr., R.L. Holland, E.K. Winslow (*Cha
man*), Jerry Harvey, W.E. Smith, W.W. Hardgrave
Adjunct Associate Professor H.C. Demoody
Assistant Professors Elizabeth Adams, John Lobuts, Jr., D.B. Rasmussen

SECOND GROUP

118 **Introduction to Information Processing** (3) Smith, Demood
(*Formerly Introduction to Data Processing*)
Basic principles and methods. A management-oriented introduction
the fundamentals, potentials, and problems of computer-based data pro
essing as a tool for record-keeping, resource-controlling, and decisio
making. (Fall and spring) Sta

119 **Computer Programming for Information Systems** (3)
(Formerly Data Processing Programming)
Programming concepts, techniques, and practices. Introduction to
concepts and techniques of computer programming using the FORTRA
and COBOL languages. Emphasis placed on development and understa
ing of the logic necessary to solve business data processing and manag
ment science problems on a third generation digital computer. Stud

programs are run on the University's IBM 370 computer. Prerequisite: Mgt 118. (Fall and spring)

120 **Information Systems Development I** (3) Demoody, Smith
(Formerly Data Processing Systems)
Assessment of the systems concept and its relationship to organizational information decision-making and management. Concepts and techniques involved in the initial development of new or revised computer-based information systems, e.g., systems analysis and design phases. Prerequisite: Mgt 118, 119; or permission of instructor. (Fall)

121 **Information Systems Development II** (3) Demoody, Smith
A further examination of the information systems development process, including concepts and techniques for assessment, selection, introduction, operation, and maintenance of a newly designed automated information system. Prerequisite: Mgt 120 or permission of instructor.

122 **Special Studies in Information Systems** (3) Demoody, Smith
An independent or group-study project in information systems development which may involve faculty-supervised research, a case-study project, or field experience as an intern systems analyst in a local public or private organization. Prerequisite: Mgt 121 or permission or instructor.

THIRD GROUP

201 **Advanced Administrative Management** (3) Ericson, Eastin, Brown
Principles and practices common to administrative units of all kinds. (Fall and spring)

203 **Mathematics for Management** (3) Holland
Mathematical concepts employed in the solution of management problems. Applications of analytical geometry, functions, elements of calculus, and linear algebra to optimization problems. Prerequisite: algebra. (Fall and spring)

204 **Quantitative Factors in Administration** (3) Rasmussen, Holland
Survey of quantitative techniques used in the solution of management problems. Potentials and limitations of mathematical models and proper areas for their application. Topics include probability, statistical decision theory, linear programming, waiting line, inventory replacement models. (Fall and spring)

207 **Human Behavior in Organizations** (3) Lippitt, Winslow, Harvey
Individual, group, intergroup, and other human behavior and development; application of social science research to administration. Learning exercises and practical applications emphasized. (Fall and spring)

208 **Current Issues in Organizational Behavior** (3) Winslow
Study of behavioral factors relating to issues such as automation, ethics, interpersonal relations, organizational change, and similar problems. Problems in behavioral science research. Prerequisite: Mgt 207. (Fall and spring)

210 **Behavioral Factors in the Process of Change** (3) Harv

Review of current research, theory, and practice related to the process change. Basic principles of planned change; individual, group, organiza tion, community, and cultural change. Emphasis on human behavio research and theory related to the change process. Prerequisite: Mgt 20 (Fall and spring)

212 **Organizational Development: Concepts and Methods** (3) Lipp

Primarily for doctoral students. Examination of different concepts o organizational structure, processes, and growth. Models of organizationa change will be developed with a taxonomy of methods of initiating actio to further organizational development. The methods of action, researc team building, confrontation methods, objectives analysis, survey fe search, and structural revision will be related to organizational develop ment processes. Prerequisite: Mgt 210 or equivalent. (Fall)

213 **Consultative Processes in Organizations** (3) Lippitt, Harv

Primarily for doctoral students. Examination through actual practice well as theory of the helping process between one perso or group and another person or group. Dynamics of the consultin process will be explored as well as role differences in internal and e ternal consultation. Development of skill in the helping relationship w be furthered within the framework of interpersonal relation concepts a laboratory experiences. Prerequisite: Mgt 210 or equivalent. (Sprin

224 **Theory and Management of Systems** (3) Erics

Introduction to systems theory and qualitative systems analysis. Analy of systems in organizations and their impact on management: systems point of view, enterprise as a system, effect of technical and managem systems on organization structure, information-decision systems, syste design, and dynamic aspects of organizational systems. Prerequisite: M 201, 204 or 225 (off campus), 207. (Fall)

225 **Managerial Statistics I** (3) Rasmussen, Hardgr

(*Formerly Introduction to Managerial Statistics*)

The mathematics of probability and statistics and its applications in m agement science and operations research. Topics include random v ables; discrete and continuous probability distributions; moments a other descriptive measures; sampling theory; and an introduction to sta tical estimation, hypothesis testing, and regression analysis. Prerequis Mgt 203 or equivalent. (Fall and spring)

226 **Managerial Statistics II** (3) Rasmussen, Hardgr

Management applications of the theory and techniques of mathemati statistics. Topics include maximum likelihood and other methods of e mation, hypothesis testing, descriptive measures of bivariate distribution regression and correlation, analysis of time series, econometric mod and multiple regression, statistical decision theory, and the revision probabilities in decision-making. Prerequisite: Mgt 225. (Fall spring)

227 **Mathematical Programming: Techniques and Applications** (3) Hardg

Technical and management considerations of linear and nonlinear p gramming. Mathematical and computational aspects of linear prog

ming. Formulation of linear programming models. Studies of applications of linear programming. Introduction to theory and application of nonlinear programming. Prerequisite: Mgt 203 or equivalent. (Fall)

228 **Techniques of Operations Research** (3) Hardgrave
(*Formerly Systems Analysis by Simulation*)
Survey and introduction to contemporary operations research techniques. Analytical methods such as simulation, queuing, Markov chains, dynamic programming, game theory, and network flows. Prerequisite: Mgt 225, 227.

229 **Seminar: Management Science and Operations Research** (3) Hardgrave
Supervised study in depth and advanced projects in management science and operations research. Prerequisite: Mgt 226, 227; or permission of instructor. (Spring)

230 **Administration of Research and Development** (3) D. Roman
Examination of technological, political, and economic factors affecting the R&D environment; operational aspects; management problems in military, governmental, and industrial organizations; project selection, resource allocation, personnel, planning and control, measurement and evaluation. (Fall)

231 **Seminar: Administration of Research and Development** (3) D. Roman
Individual and/or group in-depth research projects dealing with various phases of research and development management. Topic will vary each time the course is offered according to the emerging technology, current operational problems, and student interest. Prerequisite: 6 to 9 semester hours of research and development management or permission of instructor.

240 **Survey of Information Technology** (3) Adams, Demoody, McCarthy, Smith
(*Formerly Mgt 218 Survey of Data Processing*)
A management-oriented presentation of the vocabulary, concepts, and trends in computer hardware and software, information systems design and development, organizational impact, and effective management; milestones of past and current research; computer technology as a rapidly evolving force of major significance in business, government, and industry. Designed for students without prior information technology experience who do not plan to take additional information technology courses. (Fall and spring)

241 **Management Information Systems Development and Application** (3) McCarthy
(*Formerly Mgt 221*)
Contemporary theories and practices in the development of management information systems. Participation in the design of information systems specifications. The roles of both management and systems design personnel in the systems development process studied and evaluated. Impact of management information systems upon the organization and its decision-making processes evaluated. Case studies. Prerequisite: an introductory course in information technology, or permission of instructor. (Fall)

242 **Comparative Computer Systems** (3) Wofsey, McCar
(Formerly Mgt 220 Comparative Digital Computer Systems and T
Management)
Characteristics and capacities of the range of information process
equipment in use today. Recent and prospective equipment and softwa
development. Selection of computers and related software and equ
ment. Prerequisite: Mgt 241 or permission of instructor. (Spring)

243 **Management of Information Technology** (3) Adam
(Formerly Mgt 223 Management of a Data Processing Organization)
Advanced course; emphasis on principles, practices, and trends in th
management of information technology. Topics include the role of
control of an information processing installation; trends, new hardwa
and advanced technology in the computing milieu and their implicatio
for information processing management; and analysis of the performan
of the data processing activity internally and externally, according to d
veloped criteria. Case studies. Prerequisite: Mgt 241, 242; or permissio
of instructor. (Fall)

244 **Information Systems and Telecommunication** (3) McCarthy, Schwar
Study of the growing linkages among the technology of informatio
processing, information transmission, and organization management
computers, communications, and managers—from two points of view
(1) new potentials for improved management, and (2) solving pr
problems of informations systems design, implementation, and operatio
Admission by permission of instructor. (Fall)

245 **Data Base Management** (3) Smith, Adam
An in-depth approach to the understanding and use of the latest tech
niques for developing and implementing an effective data base syste
Topics include data base organization, creation, and maintenance; effe
and economic justification; evaluation criteria; standardization of data ba
systems; impact of packaged data management systems; and an analysis
the current state-of-the-art in data base development. Prerequisite: M
119, 241. (Spring)

249 **Seminar: Information Technology** (3) Wofs
(*Formerly Mgt 222 Seminar: Advanced Digital Computer Concepts*)
Current problems in the design and implementation of computer-base
systems; emphasis on current state-of-the-art through discussion w
leading experts in the field, analysis of literature. Prerequisite: Mgt
242, 243; or permission of instructor. (Fall and spring)

262 **Seminar: Contemporary Administrative Theory** (3) Ersk
Primarily for doctoral students. Current and prospective theory and pr
tice from an inter- and trans-disciplinary viewpoint. Topics include g
eral systems theory, game theory, axiology and management values, a
thetics, value engineering, cybernetic systems, decision theory, innova
and creativity models, and general semantics. Prerequisite: Mgt
204, 207, 224. (Fall and spring)

295 **Research Methods** (3) S
Research techniques, sources of information, array and analysis of d
interpretation and presentation of the findings. (Fall and spring)

Mathematics

Professors David Nelson, T.P.G. Liverman *(Chairman)*, Hewitt Kenyon, Choy-Tak Taam
Professorial Lecturers D.M. Dribin, Joseph Blum
Associate Professors W.A. Smith, Dagmar Henney, Irving Katz, I.I. Glick, M.D. Green, Ruth Bari, Myrna Lee
Associate Professorial Lecturer S.L. Brodsky
Assistant Professors E.A. Stone, H.D. Junghenn
Assistant Professorial Lecturer Mabel Morris

Bachelor of Arts or *Bachelor of Science with a major in Mathematics (Departmental).*—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87.
2. Prerequisite courses—Math 31, 32, 33 (Math 30, a prerequisite to Math 31, may be waived upon examination before registration).
3. Required courses in the major—a minimum of 24 semester hours of second-group courses in Mathematics, including Math 106, 121, 123, 139, and 140. It is also strongly recommended that students take French, German, or Russian, and mathematically related courses in such subjects as Physics, Statistics, Economics, and Engineering.

Bachelor of Arts or *Bachelor of Science with a major in Applied Mathematics (Departmental).*—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87.
2. Prerequisite courses—Math 31, 32, 33, (Math 30, a prerequisite to Math 31, may be waived upon examination before registration).
3. Required courses in related areas:
   (a) Stat 189–90.
   (b) Eighteen semester hours to be selected, in consultation with the adviser, from the following Areas of Application. At least 12 semester hours must be chosen from one Area, and the other 6 semester hours must be chosen from courses numbered 101 or higher. For courses in Applied Science, Civil Engineering, Electrical Engineering and Computer Science, Engineering Administration, Mechanical Engineering, and Operations Research, see the *School of Engineering and Applied Science* Catalogue.

Area I. Social and Management Sciences—courses chosen from Ap S 115, CE 197; Econ 1–2, 101, 102, 123, 199; E Ad 261, 269, 281–82, 283, 284; EE 184, 284, 285; Math 101, 102, 113, 124; OR 201, 209, 251, 252, 261, 277, 279, 291; Stat 113, 117, 118, 131, 157–58, 159, 161–62, 165–66, 188, 197.

Area II. Engineering and Physical Sciences—courses chosen from Chem 111–12, CE 120, 123, 140, 166, 167, 168, 185, 186, 190, 191, 192, 193, 196, 198, 201, 203, 204, 205, 206, 207, 210, 213, 220, 223, 252, 254, 258, 261, 262, 263, Stat 107, 117, 118, 131, 157–58, 159, 161–62, 197; and any course offering in trical Engineering and Computer Science, Mechanical Engineering, or Physics.

Area III. Computer Sciences—courses chosen from EE 152, 153, 154, 157, 158; 102, 113, 124, 142, 153, 154, 157; Stat 113, 157–58, 161-62, 165–66, 197.

Required courses in the major—a minimum of 24 semester hours of second-courses in Mathematics, including Math 111, 112, 139, 140, 181–82. It is also ly recommended that students take French, German, or Russian.

ter of Arts in the field of Mathematics.—Prerequisite: a Bachelor's degree major in Mathematics from this University, or an equivalent degree.

uired: the general requirements, pages 92–99. Students must complete 30 er hours of approved course work with or without a thesis.

ter of Arts or *Master of Science in the field of Applied Mathematics.*—Pre-

requisite: a Bachelor's degree with a major in Mathematics or a related field such as Statistics, a physical science, Engineering, or Economics.

Required: the general requirements, pages 92–99. Course work is divided between Mathematics courses and courses from one Area of Application—Economics, Engineering (Civil, Computer Science, Electrical, Engineering Administration, Mechanical, or Operations Research), Physics, Statistics, Urban and Regional Planning. Courses in the chosen Area of Application are selected in consultation with the relevant department.

Candidates for the degree of *Master of Arts* must complete 30 semester hours of approved course work, including Math 299–300 *Thesis Research*. At least 15 semester hours must be in Mathematics courses, with no more than 3 of these from second-group courses. The remaining courses are chosen from the selected Area of Application. Theses are jointly supervised by the Department of Mathematics and the department concerned with the Area of Application.

Candidates for the degree of *Master of Science* must complete 30 semester hours of course work; at least 15 of these must be in Mathematics courses, with no more than 6 semester hours from second-group courses. There is no thesis requirement.

Master of Science for Teachers.—Prerequisite: A Bachelor's degree; at least 15 semester hours or equivalent in Mathematics courses, including the equivalent of Math 31; experience in teaching mathematics at the secondary school level.

Required: 30 semester hours of approved second- or third-group Mathematics courses, including Math 168.

Doctor of Philosophy in the field of Mathematics.—Required: the general requirements, pages 92–96, 99–101. The Departmental doctoral program committee, after consultation with the student, will stipulate (1) courses which must be taken to fulfill the 48-semester-hour requirement leading to the General Examination; (2) the two languages, selected from French, German, and Russian, which must satisfy the foreign language requirement; and (3) the four areas of study in which the student must prepare for the General Examination. The doctoral program committee will appoint a Director of Research when the student has selected (preferably earlier in his program) one of the following research fields for his dissertation: Functional Analysis (Abstract Differential Equations, Functional Equations, Generalized Functions, Groups of Operators), Group Representations, Linear Algebra (Matrix Theory), Logic, Measure and Integration, Ordinary and Partial Differential Equations, Theory of Numbers, and Topology (General Topology, Analytic Topology, Topological Groups).

Bachelor of Arts in Education with a teaching field in Mathematics.—Prerequisite: the Education curriculum, page 78.

Required: the Mathematics option and the professional courses listed on pages 115, 119.

FIRST GROUP

3 College Algebra (3) Morris and Staff

Equivalent to the standard two years of high school algebra with several additional topics. Prerequisite: one year each of high school algebra and high school geometry. (Fall and spring)

6 Plane Trigonometry (3) Morris and Staff

Prerequisite: two years of high school algebra and one year of high school geometry, or Math 3 (or concurrent registration therefor). (Fall and spring)

9 General Mathematics I (3) Smith and Staff

For students electing Math 9 and 10 as a terminal sequence. Logic, sets,

number systems. Prerequisite: two years of high school mathematics. (Fall and spring)

10 **General Mathematics II** (3) Smith and Staff

Mathematical systems, geometry, and introduction to statistics and probability. Prerequisite: Math 9. (Fall and spring)

30 **Precalculus** (3) Bari and Staff

Set theory, inequalities, basic analytic geometry, functions and relations. Polynomial, trigonometric, logarithmic, and exponential functions. Prerequisite: Math 3 and 6; or one and one-half years of high school algebra, one year of high school geometry, and one-half year of high school trigonometry; or equivalent. Prior to registration, new students must take a placement examination in algebra and trigonometry. (Fall and spring)

31 **Calculus of One Variable** (3) Green and Staff

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30 or equivalent.* (Fall and spring)

32 **Calculus of Several Variables** (3) Green and Staff

Vectors, determinants, partial derivatives, multiple integrals, curves. Prerequisite: Math 31. (Fall and spring)

33 **Calculus of Vector Functions** (3) Green and Staff

Differential equations, infinite series, vector calculus, line integrals, Green and Stokes theorems. Prerequisite: Math 32. (Fall and spring)

51 **Mathematics for the Social and Management Sciences I** (3) Glick and Staff

Notion of function, graph of function; sequences; differential and integral calculus of functions of one variable; exponential and logarithmic functions. New students must take a placement examination in algebra prior to registration. (Fall and spring)

52 **Mathematics for the Social and Management Sciences II** (3) Glick and Staff

Functions of several variables; partial derivatives, maxima and minima, Lagrange multipliers; systems of linear equations and inequalities; matrix algebra, determinants, rudiments of linear programming. Prerequisite: Math 51. (Fall and spring)

ECOND GROUP

101 **Introduction to Mathematical Logic** (3) Nelson

Introduction to proof theory and model theory of propositional and predicate calculi, computability, topics from foundations of mathematics. Open to sophomores with permission of Department. Prerequisite: Math 32 or permission of instructor. (Fall)

102 **Axiomatic Set Theory** (3) Nelson

Zermelo-Fraenkel set theory, ordinals and cardinals, foundations of the

*Math 30 may be waived as a prerequisite by examination on scheduled dates.

real number system. Prerequisite: Math 101 or permission of instruct
(Spring 1974 and alternate springs)

103 **Foundations of Mathematics for the Nonmathematician** (3) Nels
A popular approach. Set-theoretic foundations of mathematics; constr
tivism, finitary and intuitionistic mathematics, computability and deci
bility; Turing machines and the Goedel theorems; the paradoxes; n
classical systems of logic. Prerequisite: two years of high school mat
matics. (Fall)

104 **Mathematics and Human Thought** (3) Drib
Philosophical and historical aspects of mathematics and its interpl
with other disciplines from antiquity to modern times. Prerequisite: tw
years of high school mathematics.

106 **Introduction to Topology** (3) Gree
Prerequisite: Math 139 or permission of instructor. (Spring)

107 **Introduction to Algebraic Topology** (3) Ba
Prerequisite: Math 122 and 139, or permission of instructor. (Fa
1974 and alternate falls)

111 **Mathematics for Engineers and Physicists I** (3) Henney and Staf
Differential equations, linear algebra, Fourier series and integral, differe
tial equations of the first order. Prerequisite: Math 32. (Fall)

112 **Mathematics for Engineers and Physicists II** (3) Henney and Staf
Ordinary differential equations, systems of differential equations, boundary
value problems, partial differential equations. Prerequisite: Math 11
(Spring)

113 **Graph Theory** (3) Bari and Staf
Directed and undirected graphs; bridges, cutpoints, and blocks; connec
tivity; partitions; Eulerian and Hamiltonian graphs; planarity; coloring
problems. Prerequisite: Math 32.

121–22 **Introduction to Abstract Algebra** (3–3) Lee and Staf
Selected topics in elementary number theory, groups, rings (including
polynomial rings), and fields. Open to sophomores with permission o
Department. Prerequisite: Math 32 or permission of instructor.
(Academic year)

123 **Linear Algebra** (3) Lee and Staf
Theory of vector spaces, linear transformations, and matrices. Quadratic
and bilinear forms, spectral decomposition. Prerequisite: Math 121.
(Fall)

124 **Introduction to Matrix Theory** (3) Katz and Staf
Operations on matrices, linear equations, matrix inversion, vector spaces
characteristic roots and vectors, spectral theorem, quadratic forms. Pre
requisite: Math 31 or 52. (Fall)

134 **Introduction to Boundary-value Problems** (3) Blum
Prerequisite: Math 111 or 142. (Spring 1975 and alternate springs)

135 **Projective Geometry** (3) Dribin
Prerequisite: Math 123 or 124, or equivalent. (Fall 1973 and alternate
falls)

139 **Advanced Calculus I** (3) Liverman and Staff

Review and extension of elementary one-variable calculus, emphasis on the theoretical foundations; differential calculus of several variables. Prerequisite: Math 33. (Fall and spring)

140 **Advanced Calculus II** (3) Liverman and Staff

Differential and integral calculus of several variables; contraction maps, implicit function and differential equation theorems. Prerequisite: Math 139 or equivalent. (Spring)

141 **Advanced Calculus III** (3) Liverman and Staff

Tensors, differential forms, Stokes theorem, introductory differential geometry. Prerequisite: Math 140.

142 **Theory of Differential Equations** (3) Glick and Staff

Prerequisite: Math 139. (Fall)

153 **Introduction to Numerical Analysis** (3) Brodsky

Introduction to fundamentals of numerical analysis using modern digital computers. Solution of linear systems and of ordinary differential equations. Interpolation polynomials. Iterative solution of nonlinear equations. Simple quadrature techniques. Prerequisite: Math 111 or 139, or equivalent. (Fall 1974 and alternate falls)

154 **Difference Equations** (3) Brodsky

Introduction to finite differences equations and their solution. Physical examples and analogies with differential equations are employed to motivate and apply the techniques developed. Generating functions. Analysis of error and stability characteristics. Prerequisite: Math 111 or 139, or equivalent. (Spring 1975 and alternate springs)

157 **Introduction to Complex Variable Theory** (3) Henney and Staff

Prerequisite: Math 139. (Spring)

*160 **Introduction to Abstract Algebra for Teachers** (3) Bari and Staff

Basic algebraic structures, such as groups, rings, integral domains, and fields; properties of integers and rational numbers. Prerequisite: Math 31 or equivalent.

*161 **Introduction to Linear Algebra for Teachers** (3) Bari and Staff

Linear functions, solution of equations, quadratic forms, change of basis. Prerequisite: Math 31 or equivalent.

*162 **Introduction to Geometric Theories for Teachers** (3) Bari and Staff

Postulational developments of Euclidean and non-Euclidean geometries. Prerequisite: Math 31 or equivalent.

*163 **Advanced Calculus for Teachers** (3) Bari and Staff

Rigorous re-examination of one-variable calculus, emphasis on limit, continuity, differentiability, Riemann integration. Prerequisite: Math 160 or permission of instructor.

*164 **Foundations of Mathematics for Teachers** (3) Bari and Staff

Logic, set-theory, and foundations of the real number system. Prerequisite: Math 31 or equivalent.

* Open only to candidates for the degree of Master of Science for Teachers, teachers for in-service training, or students recommended by the Department of Education.

*165 **Introduction to Theory of Numbers for Teachers** (3) Bari and S
Selected topics from theory of numbers. Prerequisite: Math 31 or equ
alent.

*166 **Introduction to Graph Theory for Teachers** (3) Bari and S
Graph theory with applications to matchings, networks, programmi
economics, psychology, biology, puzzles. Prerequisite: Math 31 or equ
alent.

*167 **Introduction to Topology for Teachers** (3) Bari and St
Elements of topology with some simple applications. Prerequisite: Ma
163 or permission of instructor.

*168 **Seminar: Curriculum Studies** (3) Bari and Sta
Critical examination of secondary school mathematics curricula, tec
niques, and programs. Prerequisite: Math 31 and permission of instructo

*169 **Proseminar in Mathematics for Teachers** (3) Bari and Sta
Topics in mathematics; emphasis on directed individual research. Pre
requisite: Math 31 and permission of instructor.

181–82 **Seminar: Applied Mathematics** (3–3) Glick
Prerequisite: Math 140, Stat 189–90, some knowledge of linear algebra
senior status as a major in Applied Mathematics. (Academic year)

191 **Special Topics** (arr.) Staff
Admission by permission of instructor. May be repeated for credit.
(Fall or spring)

195 **Reading and Research** (arr.) Staff
Under the personal direction of an instructor. Limited to Mathematics
and Applied Mathematics majors with demonstrated capacity. Prior ap
proval of instructor required. May be repeated for credit. (Fall o
spring)

THIRD GROUP

Requirements for graduate degrees in Mathematics at George Washington Uni
versity are described on pages 337–38. Courses in Mathematics for the fulfil
ment of these requirements are given jointly by Catholic University of America
George Washington University, and Georgetown University each year at one
location (1973-74—George Washington University; 1974-75—Catholic Uni
versity of America; 1975-76—Georgetown University).

Courses marked with an asterisk (*) are offered every year.

1973-74 TEACHING STAFF FROM COOPERATING UNIVERSITIES

Catholic University of America

Professors Witold Bogdanowicz, Parfeny P. Saworotnow
Associate Professors Gustav B. Hensel, John N. Welch
Assistant Professors Charles Byrne, Leonard J. Gallagher, Joseph V. Michal
owicz

* Open only to candidates for the degree of Master of Science for Teachers, teachers for in-service training, or students recommended by the Department of Education.

Georgetown University

Professors John Lagnese, Arnold P. Stokes
Associate Professors E. Ray Bobo, Richard F. Datko
Assistant Professors George Benke, Giuliano Gnugnoli, Bruce Orcutt, Ronald Rosier, Allen B. Tucker

ALGEBRA

*201 **Graduate Algebra I** (3) Lee
Groups, including Sylow theorems, direct decomposition of finitely generated Abelian groups, solvable nilpotent and simple groups, free groups. (Fall 1973)

*202 **Graduate Algebra II** (3) Lee
Rings, including prime and maximal ideals, Euclidean and unique factorization domains, polynomial rings; modules over rings, including tensor product; semi-simple rings and algebras, including the Wedderburn theorem; Noetherian rings, including primary decomposition theorem. Prerequisite: Math 201 or permission of instructor. (Spring 1974)

203 **Graduate Algebra III** (3) Bobo
Fields, including Galois theory, valuation theory. Prerequisite: Math 202 or permission of instructor. (Fall 1973)

204 **Rings and Homology** (3)
Prerequisite: Math 202 or permission of instructor. (Fall 1974)

205 **Homological Algebra and Category Theory** (3) Michaelowicz
Categories, functors, natural transformations; examples; functor categories, quotient categories; universal arrows, limits; adjoint functors, monads (triples); Abelian categories; imbedding theorems; modules, projective and injective; extensions and satellites, Ext and Tor. Prerequisite: Math 202 or permission of instructor. (Spring 1974)

206–7 **Quadratic Forms I–II** (3–3) Katz
Prerequisite: undergraduate course in linear algebra. Academic year 1973-74)

208 **Combinatorics** (3) Bari
Prerequisite: undergraduate modern algebra and linear algebra. (Fall 1973)

209–10 **Representations of Groups I–II** (3–3)
Prerequisite: Math 202 or permission of instructor. (Academic year 1974-75)

211 **Group Theory I** (3) Bobo
Prerequisite: Math 201. (Spring 1974)

212 **Group Theory II** (3)
Prerequisite: Math 211. (Fall 1974)

213 **Nonassociative Algebras** (3)
Lie and Jordan algebra. Prerequisite: Math 202. (Spring 1975)

214 **Algebraic Number Theory** (3)

Prerequisite: Math 203 or permission of instructor. (Spring 1975)

215 **Topics in Algebra** (3)

ANALYSIS

*220 **Introduction to Modern Analysis** (3) Gallagh

Real numbers, least upper bounds, completeness, Bolzano-Weierstra theorem; Banach spaces, examples: R^n, C [a, b], l_1, l_2. Hilbert space limits of real and vector sequences, limits of real and vector functions, basic properties of real and vector continuous functions, differentiatio and integration of real and vector functions, basic properties of compac sets, closed and open sets, linear transformations on R^n to R^m, fixed point theorem and applications to differential and integral equations Fourier series, Stone-Weierstrass theorem. (Fall 1973)

*221 **Introduction to Complex Analysis** (3) Jungher

Algebra, geometry, and topology of complex numbers; definitions and properties of elementary functions, e.g., e^z, sin z, log z; integrals, functions defined by integrals; Cauchy's theorem and formula, integral representation of derivatives of all orders; maximum modulus, Liouville's theorem fundamental theorem of algebra; Taylor and Laurent series; uniform convergence, term-by-term differentiation; domain of convergence and classification of singularities; contour integration; the residue theorem evaluation of integrals involving single-valued functions; analytic continuation, multivalued functions, and branch points; technique for contour integrals involving multivalued functions. Prerequisite: Math 220 or equivalent. (Spring 1974)

222 **Applications of Complex Analysis** (3) Liverma

Potential theory and conformal mapping. Special functions. Asymptotic expansions; steepest descent, stationary phase, and WKB methods. Fourier and Laplace transforms, applications to partial differential equations Wiener-Hopf method, dual and singular integral equations. Prerequisite: Math 221 or an undergraduate course in complex variables. (Fall 1973)

223 **Advanced Complex Analysis** (3) Rosin

Harmonic functions, partial fractions, Mittag-Leffler theorem; infinite products, entire functions, the Hadamard product theorem, the gamma function, representations of the gamma function; Hurwitz's theorem normal families of functions, Montel's theorem, the Riemann mapping theorem, elementary conformal mapping; analytic continuation, the monodromy theorem, branch points, Riemann surfaces. Prerequisite: Math 221 or equivalent. (Spring 1974)

*224 **Measure and Integration Theory** (3) Byrn

Lebesgue integration over the space of reals; the basic convergence theorems, including monotone and dominated convergence theorems measurability; almost everywhere differentiability of monotone functions absolute continuity; the L_P spaces and orthogonal expansions; duality of L_P and L_q spaces; orthonormal systems in L_2 (a, b); integration over the space R^n; theorems of Fubini and Tonelli. Prerequisite: Math 220 or equivalent. (Fall 1973)

*225 **Introduction to Functional Analysis** (3) Saworotnow

Topological and metric spaces; compact spaces and Tychonoff theorem; complete metric spaces and completion of a metric space; Normed and Banach spaces; linear functionals; Hahn-Banach theorem; principle of uniform boundedness and applications; elementary introduction to distribution theory; linear operators; the closed-graph theorem and interior mapping principle; Hilbert spaces; inner product, orthogonality, and orthonormal systems; eigenvalues, eigenvectors, invariant subspaces, and projection operators; operational calculus of functions defined on the spectrum. Prerequisite: Math 220 or equivalent. (Fall 1973)

*226 **Banach Algebras and Spectral Theory of Operators** (3) Saworotnow

Gelfand theory of commutative Banach algebras; function algebras, Stone-Cĕch compactification; application to the spectral theory of operators, spectral theorem for bounded and unbounded operators; Jacobson radical for arbitrary Banach algebras; H*-algebras and Hilbert modules; related topics. Prerequisite: knowledge of measure and integration, introduction to functional analysis, and Tychonoff and Stone-Weierstrass theorems. (Spring 1974)

227 **Fourier Analysis on Locally Compact Groups** (3) Saworotnow

Elementary properties of topological groups, existence of Haar measure, modular functions, group algebras; application of Gelfand theory to the group algebra; applications to classical theory of Fourier series and integrals; compact and discrete groups, Plancherel and Pontryagin theorems; positive definite functions and positive linear functionals, Stone and Bochner theorems; representations of a compact group G; H*-algebra valued positive definite functions, generalization of Stone and Bochner theorems, their application to multivariate and infinite dimensional stationary processes; related topics. Prerequisite: knowledge of topological groups, measure and integration, and introduction to functional analysis, and some familiarity with Gelfand theory. (Spring 1974)

228 **Theory of Generalized Functions and Distributions** (3)

Fréchet and countable union spaces; definition, structure, and properties of Schwartz distributions and generalized functions; applications to explicit solutions and existence theory of ordinary and partial differential equations, nested Hilbert spaces; generalized Fourier transform. Prerequisite: Math 220 or permission of instructor. (Spring 1975)

229 **Ergodic Theory** (3) Taam

Topics selected to serve research interests of instructor and students; emphasis on recent developments and applications to dynamical systems and Markov processes. Prerequisite: Math 224, 225; or permission of instructor. (Spring 1974)

230 **Differential Equations in Banach Space** (3) Taam

General theory of linear and nonlinear differential equations in Banach space; periodic and almost periodic solutions; stability of solutions. Prerequisite: Math 225 or permission of instructor. (Fall 1973)

231 **Semi-groups of Operators and Almost Periodic Functions** (3)

Almost periodic functions on the real line and on groups; general theory of weakly almost periodic semi-groups of operators, their asymptotic behavior and convergence into almost periodic groups of operators. Prerequisite: Math 224, 225, 226; or permission of instructor. (Fall 1974)

232 **Seminar: Functional Analysis** (3)

Topic selected to serve research interests of instructor and students; qualified students encouraged to work on research projects. Admission by permission of instructor. (Spring 1975)

233 **Foundations of Probability Theory and Statistics** (3)

Review of the basic concepts of measure and integration theory; probability and expectation; random variable, random process; distribution function and Kolmogorov consistency theorem; characteristic function of a random variable; distributions of Bernoulli, Poisson, Gauss, Polya, Cauchy, Laplace; applications; stochastic independence; Kolmogorov's strong law of large numbers; central limit theorem; applications to statistics. (Fall 1974)

234 **Introduction to the Theory of Random Processes** (3)

Stochastic dependence, conditional expectation, limit theorem for submartingales; Markov process; theory of Markov chains; Poisson's process; process of birth and death; Kolmogorov-Chapman equations; second-order stationary random processes; filtering and prediction; Wiener-Hopf equation and its solution; second-order discrete stationary random processes. Prerequisite: Math 233. (Spring 1975)

Katz

*235 **Linear Algebra** (3)

Vector spaces, affine spaces; linear transformations, invariant subspaces; matrices, determinants, tensor products; inner-product spaces, orthogonality; linear functionals, dual spaces, adjoint transformations; spectral theorem; quadratic forms; Hilbert spaces. (Fall 1973)

APPLIED MATHEMATICS

Stokes

*240 **Introduction to Ordinary Differential Equations** (3)

First course in ordinary differential equations; existence and uniqueness of solutions; continuity of solutions with respect to initial conditions; properties of linear systems. Prerequisite: advanced calculus. (Fall 1973)

Glick

241 **Stability Theory of Ordinary Differential Equations** (3)

Introduction to basic notions of stability and asymptotic stability; Liapounov's functions used to establish stability or instability; converse theorems of Liapounov's direct method; comparison theorems, differential inequalities. Prerequisite: Math 240 or permission of instructor. (Fall 1973)

242 **Theory of Dynamical Systems** (3)

Basic properties of dynamical systems; α and ω limit sets, recurrent motions, minimal sets; ergodic motions, ergodic theorems of Birkhoff and Von Neumann. Prerequisite: Math 240 or permission of instructor. (Fall 1975)

Stokes

243 **Theory of Nonlinear Oscillations** (3)

Existence and stability of periodic solutions of ordinary differential equations; derivation of bifurcation equation for weakly nonlinear systems; introduction to the method of averaging, the existence and stability of almost periodic solutions and integral manifolds. Prerequisite: Math 240 or permission of instructor. (Spring 1974)

244 **Theory of Differential Equations with Delays** (3)

Basic theory of functional differential equations (differential-difference equations, equations with delay); theory of linear systems, constant or periodic coefficients; stability theory, Liapounov functionals; existence and stability of periodic and almost periodic solutions. Prerequisite: Math 240 or permission of instructor. (Spring 1975)

245 **Eigenvalue and Boundary-value Problems** (3)

Normed spaces, integral equations, spectral theory of compact operators; application to boundary and eigenvalue problems of ordinary differential equations. Prerequisite: advanced calculus. (Fall 1974)

246 **Numerical Methods in Ordinary Differential Equations** (3)

Finite difference methods for initial-value and boundary-value problems; error analysis, analysis of stable schemes; Galerkin's method, with estimation of error in eigenvalue problems. Prerequisite: Math 240 or permission of instructor. (Spring 1975)

247 **Control Theory of Ordinary Differential Equations** (3) Datko

Optimal control of linear systems, control of linear systems with convex cost functionals, the maximal principle and selected topics on control systems. (Spring 1974)

248 **Fourier Analysis and Integral Transforms** (3)

Fourier series, Fourier integral in one and several variables, Fourier-Stieljes transform, inversion of Fourier transforms, Tauberian theorems, bilateral Laplace transform and applications. Prerequisite: advanced calculus, knowledge of Lebesgue integration, acquaintance with the elementary parts of the theory of functions of a complex variable. (Fall 1975)

249 **Differential Games** (3)

The idea of a differential game. Examples, discrete games, procedures for solving certain types of games, and the study of surfaces involved in solving differential games. (Spring 1976)

250 **Calculus of Variations** (3)

Introduction to the calculus of variations via the notion of the Frechet derivative, the Euler equations, the Hamilton-Jacobi equations; sufficient conditions for a solution to exist, applications to mechanics and physics. (Fall 1974)

251 **Partial Differential Equations with Applications to Mathematical Physics I** (3) Bogdanowicz

Study of elliptic, hyperbolic, and parabolic partial differential equations; applications to some classical problems of mathematical physics. (Fall 1973)

252 **Partial Differential Equations with Applications to Mathematical Physics II** (3)

253–54 **Introduction to Numerical Analysis I–II** (3–3) Orcutt

Elements of theory and practice of numerical analysis using modern digital computers; solution of linear systems and nonlinear equations; computation of eigenvalues and eigenvectors; basic approximation theory; interpotation techniques; numerical quadrature; solution of differential equations. Prerequisite: advanced calculus. (Academic year 1973-74)

255 **Introduction to Generalized Functions and Fourier Transforms** (3) Liverman

Sequential definition of generalized functions—operational solution of differential equations and systems. Generalized function Fourier series, generalized function Fourier and Laplace transforms, applications to initial and boundary-value problems. Prerequisite: Math 220 or advanced calculus. (Spring 1974)

256 **Integral Equations** (3) Lagnese

Volterra linear integral equations of first and second kind with applications to linear ordinary differential equations; Fredholm linear integral equations of first and second kind, applications to Sturm-Liouville problems; some singular or nonlinear integral equations. (Fall 1973)

257 **Control Theory of Partial Differential Equations** (3)

Minimization of functionals and boundary-value problems; control of systems governed by elliptic partial differential equations; control of systems governed by parabolic partial differential equations; control of systems governed by hyperbolic partial differential equations; regularization, approximation, and penalization. (Spring 1975)

258 **Numerical Methods of Partial Differential Equations** (3)

Numerical treatment of the typical initial and boundary-value problems for hyperbolic, parabolic, and elliptic equations of mathematical physics; finite difference schemes, solutions, convergence to solutions of partial differential equations; stability, error analysis, suitability of methods for practical use in digital computers. (Fall 1974)

259 **Selected Topics in Partial Differential Equations I** (3) Bogdanowicz

(Spring 1974)

260 **Selected Topics in Partial Differential Equations II** (3)

Datko

261 **Applied Linear Algebra** (3)

Application of linear algebra to problems occuring in ordinary differential equations, stochastic processes, control theory, and the social and life sciences. (Spring 1974)

Glick

262 **Convex Sets with Applications** (3) (Spring

Study of convexity and its application to linear programming. 1974)

263 **Selected Topics in Numerical Analysis** (3)

(Spring 1976)

264 **Selected Topics in Applied Mathematics** (3)

(Spring 1975)

COMPUTER SCIENCE

270–71 **Simulation of Discrete Stochastic Systems I–II** (3–3)

Introduction and definition of simulation system, discrete and continuous, stochastic and deterministic, critical event and time-slice; general outline of a simulation, how it is used and how it functions; procedure for developing a simulation; statistical topics; generating random numbers

Simulation programming and languages, simulating the passage of time and arrivals, FORTRAN, queues and list processing, PL/1, SIMSCRIPT, GPSS, general remarks; GPSS, basic concepts; simulation of computer systems; case study. Prerequisite: knowledge of computers and statistics. (Academic year 1974-75)

272 **File and Data Management and Information Processing** (3) Gnugnoli

External data structures, graph theory, paths, chains, trees, lists, sublists, multilinked lists, directories; basic structure-processing operations, creation, updating, sorting, merging, searching, linkage, hashing, Boolean searches; storage media and input/output devices; software; introduction to file organizations; consecutively organized files; keyed files; file arrangement and application; introduction to the processing, storage, and retrieval of data, emphasis on computer techniques. Prerequisite: introduction to data structures and PL/1 programming. (Fall 1973)

273 **Theory of Formal Languages and Applications** (3) Tucker

Introduction to formal languages and their related automata, applications in compiler design. Regular, context-free, context-sensitive, and unrestricted grammars; finite and pushdown store automata; Turing machines; the halting problem; formal description of programming languages' syntax and semantics; syntax-directed compiling techniques; compiler-compilers; additional topics in compiler construction. Prerequisite: introductory computer course; course in abstract algebra is recommended. (Spring 1974)

LOGIC

*278 **Introduction to Mathematical Logic** (3) Nelson

Propositional and predicate calculus (first order): syntax, formation rules, semantics, axioms, proof and deduction, object vs. metalanguage, deduction theorem, compactness theorem, Godel-Henkin completeness theorem, Craig's interpolation theorem, Beth's definability theorem. First-order recursive arithmetic: incompleteness and undecidability. (Fall 1973)

279 **Model Theory** (3) Hensel

Prerequisite: Math 278 or permission of instructor. (Spring 1974)

280 **Proof Theory** (3)

Prerequisite: Math 278 or permission of instructor. (Spring 1975)

281 **Computability and Decidability** (3)

Prerequisite: Math 278 or permission of instructor. (Spring 1976)

282 **Set Theory** (3)

Prerequisite: Math 278 or permission of instructor.

TOPOLOGY

285–86 **General Topology I–II** (3–3) Michaelowicz

General topological spaces, continuity, quotient spaces, product spaces, filters, nets, separation axioms, compactness and connectedness (global and local). Metrization, compactification, uniform spaces, uniform continuity, complete spaces, and topological groups. (Academic year 1973-74)

287–88 **Topological Vector Spaces I–II** (3–3)

Topological vector spaces, vector space topologies, linear manifolds, r
rizability and complexification. Locally convex topological vector spa
Hahn-Banach theorem, projective and inductive topologies, barreled
bornological spaces. Linear mappings, Banach's homomorphism theor
equicontinuity; uniform boundedness and the Banach-Steinhaus theor
Tensor products, nuclear mappings and spaces. Duality; dual syst
and weak topologies; Mackey-Arens theorem; strong dual, bidual,
reflexive spaces; theorems of Grothendieck, Banach-Dieudonne,
Krein-Smulian; open mappings and closed graph theorems; weak c
pactness; theorem of Eberlein and Krein. Prerequisite: general topolo
including uniform spaces, linear algebra, and real and complex variab
(Academic year 1974-75)

289 **Topological Groups** (3) Ber

General theory of topological groups; neighborhood systems of the ident
uniform structures on groups, products, and inverse limits. Locally co
pact groups, classical linear groups, Lie groups. Open homomorphi
and closed graph theorems, integration on locally compact groups, fini
dimensional representations of groups, Schur's lemma, Peter-Weyl theore
structure of metrizable compact groups. Duality, dual groups of loca
compact Abelian groups, dual groups of compact and discrete grou
Prerequisite: general topology, including uniform spaces, linear algeb
and elementary group theory. (Fall 1973)

290 **Differentiable Manifolds** (3)

Differentiable manifolds, tangent vectors and differentials, submanifol
imbeddings and immersions, quotient manifolds, vector fields, Frobeni
theorem, tensors and differential forms, Lie derivatives, manifolds wi
boundary, orientable manifolds, Stokes' theorem, and the divergen
theorem. Prerequisite: advanced calculus, linear algebra; or permissio
of instructor. (Fall 1974)

291 **Differential Geometry** (3)

Riemannian manifolds, geodesics, curvature and torsion, linear conne
tions, Gauss-Bonnet theorem, Hopf index theorem, Morse index theorem
applications to mechanics, cohomology, and the de Rham theorem; th
Laplace-Beltrami operator; Lie groups. Prerequisite: Math 290.
(Spring 1975)

292 **Introduction to Homotopy Theory** (3)

Two-dimensional manifolds, classification theorem for compact surfaces,
the fundamental group, homotopy type, homotopy equivalence of spaces,
free groups and free products of groups, presentation by generators and
relations; Seiffert-Von Kampen theorem, covering spaces of a graph,
applications to group theory. (Fall 1975)

293 **Introduction to Homology Theory** (3)

Axioms and uniqueness, Eilenberg-Steenrod axioms and some immediate
consequences. Uniqueness theorem. Computation of homology groups,
elementary applications, e.g., invariance of dimension, extensions and
retractions, fixed-point theorems, etc. Cellular homology groups, singular
homology theory. (Spring 1976)

RESEARCH

*295 **Reading and Research** (3) Staff
May be repeated once for credit. (Fall and spring 1973-74)

*299–300 **Thesis Research** (3–3) Staff
(Fall and spring 1973-74)

FOURTH GROUP

*398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring 1973-74)

*399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring 1973-74)

Microbiology

Professors Mary Louise Robbins, Rudolph Hugh, E.M. Lerner II (*Research*), L.F. Affronti (*Chairman*)
Professorial Lecturers Dorothy Heilman (*Cellular Immunology*), F.B. Gordon (*Virology*)
Associate Professors Melvin Reich, Kun-yen Huang, G.L. Wright, Jr. (*Research*)
Assistant Professors Yang-Ming Chu, Rosalie De Giovanni-Donnelly (*Research*)
Special Lecturer M.S. Legator (*Microbial Genetics*)

Master of Science in the field of Microbiology.—Prerequisite: a Bachelor's degree with a major in Biology, Botany, Chemistry, or Zoology from this University, or an equivalent degree. The undergraduate program must have included the following courses or equivalent: B Sc 11–12; Chem 11–12, 151–52, 153–54; Math 30, 31 (31 may be taken concurrently with the graduate program); Phys 1, 2.

Required: the general requirements, pages 92–99. A total of 30 semester hours is required, 24 hours of course work and 6 hours of thesis (Micr 299–300). The course work must include Micr 201 (if not presented for admission), plus Bioc 221–22; Epid 217, 218, 230; and Micr 219–20, 277–78. The remaining academic work should consist of graduate-level courses selected with the approval of the instructor.

Master of Science in the field of Mycology.—An interdepartmental degree offered by the departments of Biochemistry, Epidemiology and Environmental Health, and Microbiology. See the Department of Epidemiology and Environmental Health, which administers the program, for details.

Doctor of Philosophy in the field of Microbiology.—Required: the general requirements, pages 92–96, 99–101. Candidates must fulfill the tool requirement by passing a reading knowledge examination in French and German or by passing an examination in one of these languages and satisfactorily completing the tool requirement in Biostatistics. The General Examination covers at least four fields, two of which must be in microbiological disciplines.

Research fields: Determinative Bacteriology, Immunochemistry, Immunology, Microbial Genetics, Microbial Pharmacology, Microbial Physiology, and Virology.

201 **Medical Microbiology** (6) Sta

For medical students; open to qualified graduate students. Bacteri rickettsiae, viruses, yeasts, molds, protozoa, metazoa which relate to th health and disease of man—cultural studies, methods of diagnose theories. Laboratory fee, $16. (Spring)

214 **Tissue Cell Culture and Somatic Variation** (4) Ch

Techniques of tissue culture and means of studying somatic variations Prerequisite: Micr 201 or equivalent. (Spring)

219–20 **Scientific Writing for Graduate Students** (1–1) Robbins

Required of all graduate students prior to writing a thesis or dissertation. (Academic year)

221 **Methods of Scientific Presentation for Graduate Students** (1) Wright

Photography and graphic arts presentation of research data for publication and scientific meetings. Prerequisite: Micr 219–20. Laboratory fee, $16. (Fall)

225 **Microbial Physiology I** (3) Affronti, Reich

Morphology and biochemistry of various microorganisms with emphasis on bacteria. Prerequisite: Bioc 221–22, Micr 201. (Fall)

226 **Microbial Physiology II** (3) Affronti, Reich

Effects of physical and chemical agents on microorganisms with emphasis on antibiotics. Prerequisite: Micr 225 or permission of instructor. (Spring)

227 **Basic Genetic Mechanisms** (1) De Giovanni-Donnelly

Genetic concepts and how they relate to man in today's environment. (Fall)

230 **Immunology** (4) Wright

Fundamental immunologic concepts. Serologic and immunologic proce dures as applied to clinical and research situations emphasized. Pre requisite: Micr 201 or permission of instructor. Laboratory fee, $16. (Fall)

231 **Immunobiology** (1) Wright and Staff

Study of immunological functions of reticulo-endothelial tissues, theories of autoimmunity, graft rejection, tumor immunity, delayed hypersensitivi ties, and immunogenetics. (Fall)

233 **Biology of Viruses** (2) Robbins, Huang

Biochemical and genetic characterization of viruses. Prerequisite: Micr 201 or equivalent. (Fall)

234 **Biology of Viruses—Laboratory** (2) Robbins, Huang

Laboratory complement to Micr 233. Prerequisite or concurrent registra tion: Micr 233. Laboratory fee, $16. (Fall)

235 **Systematic Bacteriology** (2) Hugh

History of bacterial classification, international rules of nomenclature as applied to bacteria, development of bacterial classification based on rela

tionships, survey of characteristics of bacterial groups. Prerequisite: Micr 201 or equivalent. (Fall 1973 and alternate falls)

251 **Bacteriology** (2) Hugh

Clinical situations involving bacteriology; emphasis on the manner in which infectious agents bring about disease processes. Prerequisite: Micr 201 or equivalent. (Fall)

255 **Virology** (2) Huang, Robbins

General principles of virology; emphasis on clinical situations. Prerequisite: Micr 201 or equivalent. (Fall)

257 **Experimental Immunochemistry** (3) Wright

Biochemical and physiochemical characterization of antigens and antibodies. Prerequisite: Bioc 221–22 or equivalent, Micr 230. Laboratory fee, $16. Limited enrollment. (Spring 1974 and alternate springs)

258 **Microbial Genetics** (2) De Giovanni-Donnelly

Survey of microbial systems that depict basic concepts of genetic principles. Prerequisite: Micr 201 or equivalent. (Spring)

277–78 **Seminar: Microbiology** (1–1) Staff

Required of graduate students. (Academic year)

293 **Special Topics in Microbiology** (arr.) Staff

Selected topics in microbiology. May be repeated for credit. (Fall and spring)

295 **Research in Microbiology** (arr.) Staff

Content differs each time the course is offered; may be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

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ofessor George Steiner (*Chairman*)
sociate Professors Robert Parris, N.A. Tilkens
junct Assistant Professor Margaret Tolson
istant Professorial Lecturers N.O. Scribner, Jr. (*Organ*), J.E. Stephens Trumpet), Nancy Mandel, Ann Feldman (*Piano*)
dio Lecturers in Applied Music W.B. Dobry (*Piano and Organ*), Sura Kim Piano), Marian McNabb (*Piano and Organ*), Ylda Novik (*Piano*), Mali-

nee Peris (*Piano*), W.D. Petterson (*Piano*), Constance Russell (*Piano*
C.O. Dash (*Voice*), S.H. Prussing (*Voice*), Jane White (*Voice*), Richa
Parnas (*Violin and Viola*), E.C. Johns (*Guitar*), R.A. Norris (*Guitar*
R.C. Raffaelle (*Guitar*), Gretchen Scharf (*Guitar*), Dorothy Jarvine
(*Cello*), J.S. Martin, Jr. (*Cello*), N.M. Irvine (*Bass*), W.E. Fuhrma
(*Flute*), W.H. Mann (*Flute*), T.P. Perazzoli (*Flute*), R.O. White (*Oboe*)
W.R. Wright (*Clarinet and Saxaphone*), Lewis Lipnick (*Bassoon*), Walte
Maciejewicz (*Bassoon*), S.E. Ramsay (*French Horn*), G.W. Recker (*Trum*
pet), R.H. Kraft (*Trombone and Recorder*), T.H. Wardlow (*Percussion*
Instruments), Faith Carman (*Harp*)

Bachelor of Arts with a major in Music History and Literature, Music Theory or *Applied Music* (*Departmental*).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87.

2. Prerequisite courses—Mus 5–6, 6 hours of Applied Music lessons, a minimum of 4 semesters in Music Ensemble groups (or evidence of equivalent experience).

3. Required courses in related areas—12 hours of one foreign language (French, German, or Italian recommended).

4. Required courses in the major—Mus 103–4, 131–32; 6 additional hours of Music Theory courses; 6 additional hours of Music History and Literature courses, plus 6 hours of courses in the area of the major. (Music Theory majors must meet departmental requirements for proficiency in piano; Applied Music majors must perform a complete public recital or the equivalent in major solo performances.)

Master of Arts in the field of Musicology.—Prerequisite: a Bachelor's degree with a major in music, or an equivalent degree.

Required: the general requirements, pages 92–99. The program of study consists of (1) 30 semester hours of course work including a thesis (6 semester hours), or (2) with the approval of the Department, 30 semester hours of course work without a thesis.

Master of Music in the field of Music Theory, Music Composition, Conducting, or Applied Music.—Prerequisite: a Bachelor's degree with an undergraduate major in one of the following, at this University, or an equivalent degree: (1) Music History and Literature, (2) Music Theory, or (3) Applied Music.

Required: the general requirements, pages 92–99. The required second- and third-group course work is as follows:

1. *In the field of Music Theory*.—Thirty semester hours of course work including either (a) a thesis (6 semester hours) demonstrating research ability in theoretical, creative, or analytical techniques; or (b), with the approval of the Department, 6 semester hours of Music Theory courses in lieu of a thesis.

2. *In the field of Music Composition*.—Thirty semester hours of course work including a creative thesis of one composition in large form properly prepared for performance (chamber music, a symphonic form, or a choral work with orchestral accompaniment) including a written theoretical, formal, and harmonic analysis of the work.

3. *In the field of Conducting*.—Thirty semester hours of course work including a thesis (6 semester hours) demonstrating research ability in theoretical, creative, or analytical techniques; or, with the approval of the Department, 30 semester hours of course work without a thesis. The requirements also include an acceptable public conducting performance.

4. *In the field of Applied Music*.—Thirty semester hours distributed as follows: (a) 12 semester hours of Applied Music in the area of concentration (piano, harpsichord, organ, voice, string or orchestral woodwind instrument); (b) 12 semester hours of Music Theory and Music History and Literature courses; and (c) a thesis (6 semester hours). The thesis consists of a public recital or performance before a designated committee—such a recital or performance must be representative of

extensive and well-rounded repertory, performed on a professionally accepted artistic level, including verbal historical and analytical lecture notes on the musical content of the program; demonstrated leadership in an ensemble performance (opera or oratorio for voice); and a written report on some approved theoretical area related to the student's concentration.

Bachelor of Arts in Education with a teaching field in Music.—Prerequisite: the Education curriculum, page 78.

Required: the Music option and professional courses listed on pages 115–16, 119.

MUSIC HISTORY AND LITERATURE

FIRST GROUP

3 **Introduction to Musical Understanding** (3) Steiner, Tilkens

Introductory history of musical styles, related to listening; elements and materials of music. (Fall and spring)

4 **Survey of Music Literature** (3) Steiner

Introductory study of musical forms, structures, and textures; aural analysis of selected literature. (Fall)

SECOND GROUP

103–4 **History of Music** (3–3) Tilkens

Development of music in the Western World from the early Christian Era to the present. (Academic year)

105 **Music of the Baroque Period** (3) Tilkens

Study of the musical styles, techniques, and literature from 1600 to 1750. (Fall)

106 **Music of the Classic Period** (3) Tilkens

Study of styles, techniques, and literature from the 18th century schools through Haydn, Mozart, and Beethoven. (Spring)

107 **Music of the Romantic Period** (3) Mandel

Study of the musical styles, backgrounds, and literature from Schubert through the 19th century. (Fall)

108 **Music of the 20th Century** (3) Steiner

The principal schools, techniques, developments, and trends of the 20th century. (Fall)

109 **Orchestra Literature** (3) Steiner

Survey of the history and styles of orchestra literature, analysis of representative works.

110 **Chamber Music Literature** (3) Steiner

Survey of the history and styles of chamber music literature, analysis of representative works.

121 **The Opera** (3) Feldman

Survey of the history and styles of opera, analysis of representative works. (Spring)

125 **Keyboard Music Literature** (3)
Survey of the history, style, and major content of the keyboard literatu from the 16th century to the present.

173 **Piano Pedagogy** (3)
Principles, materials, and methods of piano teaching. (Spring)

199 **Independent Research** (3)
Under the guidance of an assigned instructor. Open only to qualifie Music majors. May be repeated for credit. (Fall and spring)

THIRD GROUP

203 **Bibliography and Research Methodology** (3)
(Fall)

209 **History of Musical Instruments** (3)

234 **Seminar: Performance Practices in Selected Areas** (3)

238 **Seminar: Analytical Studies in Music History** (3)

239 **Independent Research** (3)

MUSIC THEORY

FIRST GROUP

1 **Elements of Music Theory** (3)
Notation, scales, keys, intervals, terms, rhythms, and chord structure (Fall and spring)

2 **Ear-training** (3)
Melodic and harmonic dictation, ear-training, sight-singing, elementary keyboard harmony. (Spring)

5–6 **Harmony** (3–3)
Triads, inversions; chord analysis, construction, and progression; part writing, modulations, altered chords. Prerequisite: Mus 1 or satisfactory passing of placement examination. (Academic year)

SECOND GROUP

131–32 **Advanced Theory** (3–3)
Practice in 18th century contrapuntal writing and analysis, chorale pr ludes, inventions, and fugues. Prerequisite: Mus 5–6 or equivalent (Academic year)

135 **Counterpoint** (3)
Study and practice of 16th century contrapuntal techniques.

137 **Orchestration** (3)
Instrumental scoring. (Spring)

138 **Form and Analysis** (3)
Analysis of musical forms in representative musical literature.

151 **Conducting** (3) Steiner
Technique of conducting, score reading, rehearsal procedures, analysis, and interpretation of selected musical literature; practice in conducting. (Fall)

THIRD GROUP

231–32 **Composition** (3–3) Parris
May be repeated for credit. (Academic year)

237 **Seminar: Analytical Studies in Music Theory** (3) Parris

251 **Advanced Conducting** (3) Steiner

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

APPLIED MUSIC

All Applied Music courses may be repeated for credit.
All Applied Music courses are offered both fall and spring.
Mus 51, 52, 53, 54, and 55 do not include individual lessons and do not require a supplementary fee. All other Applied Music courses include individual lessons and require a supplementary fee, as follows:
1. One-semester-hour courses: individual lessons of ½ hour a week, supplementary fee, $75.
2. Three- or 6-semester-hour courses: individual lessons of 1 hour a week, supplementary fee, $100.
Supplementary fees are different for courses offered during the summer sessions. Consult the Department of Music for details.
The supplementary fee is waived for graduate degree candidates in music and full-time undergraduate music majors.

FIRST GROUP

Required practice: 3 hours a week for 1-semester-hour courses and 6 hours a week for 3-semester-hour courses. In addition, 3-semester-hour courses include assigned workshops in theory and performance.

11 **Piano** (1) Staff

12 **Piano** (3) Staff

13 **Voice** (1) Prussing, J. White, Dash

14 **Voice** (3) Prussing, J. White, Dash

15 **Organ** (1) Scribner, McNabb, Dobry

16 **Organ** (3) Scribner, McNabb, Dobry

17 **Violin** (1) Steiner, Parnas

18 **Violin** (3) Steiner, Parnas

19 **Classical Guitar** (1) Johns, Norris, Raffaelle, Scharf

20 **Classical Guitar** (3) Johns, Norris, Raffaelle, Scharf

21 **Viola** (1)
22 **Viola** (3)
23 **Cello** (1)
24 **Cello** (3)
25 **Bass** (1)
26 **Bass** (3)
27 **Flute** (1)
28 **Flute** (3)
29 **Recorder** (1)
30 **Recorder** (3)
31 **Oboe** (1)
32 **Oboe** (3)
33 **Clarinet** (1)
34 **Clarinet** (3)
35 **Saxophone** (1)
36 **Saxophone** (3)
37 **Bassoon** (1)
38 **Bassoon** (3)
39 **French Horn** (1)
40 **French Horn** (3)
41 **Trumpet** (1)
42 **Trumpet** (3)
43 **Trombone** (1)
44 **Trombone** (3)
45 **Percussion** (1)
46 **Percussion** (3)
47 **Harp** (1)
48 **Harp** (3)

51 **Orchestra** (1)
Preparation and performance of orchestral literature. Prerequisite: audition before Director.

52 **Instrumental Ensemble** (2)
Chamber ensemble groups in addition to orchestra participation.

53 **Chorus** (1) Prussing

Preparation and performance of choral literature. Prerequisite: audition before Director.

54 **Chamber Choir** (2) Prussing

Small vocal groups in addition to chorus participation.

55 **Band** (1) Recker

Concert band, stage band, and brass ensemble.

SECOND GROUP

Departmental prerequisite: Audition to meet departmental requirements.
Required practice: 6 hours a week for 1-semester-hour courses and 12 hours a week for 3-semester-hour courses. In addition, 3-semester-hour courses include master performance classes and recital preparation.

111 **Piano** (1) Staff

112 **Piano** (3) Staff

113 **Voice** (1) J. White, Dash

114 **Voice** (3) J. White, Dash

115 **Organ** (1) Scribner, McNabb, Dobry

116 **Organ** (3) Scribner, McNabb, Dobry

117 **Orchestral Instrument** (1) Staff

118 **Orchestral Instrument** (3) Staff

119 **Classical Guitar** (1) Staff

120 **Classical Guitar** (3) Staff

THIRD GROUP

Required practice: 12 hours a week for 3-semester-hour courses and 15 hours a week for 6-semester-hour courses. In addition, 6-semester-hour courses include supervised ensemble preparation and required concert solo performances.

211 **Piano** (3)

212 **Piano** (6)

213 **Voice** (3)

214 **Voice** (6)

215 **Organ** (3)

216 **Organ** (6)

217 **Orchestral Instrument** (3)

218 **Orchestral Instrument** (6)

Pathology

Professors T.M. Peery (*Chairman*), F.N. Miller, Jr., William Newman, J.C. Smith, A.W. Musser, B.H. Smith, Mary Matthews, Mario Werner (*Laboratory Medicine*), M.J. Valaske

Clinical Professors L.E. Zimmerman *(Ophthalmic)*, J.M. Blumberg, E.B. Helwig *(Dermatologic)*, G.H. Reifenstein, N.S. Irey, Robert Sauer *(Comparative)*, Cornelia Hoch-Ligeti, J.L. Luke *(Forensic)*, C.F. Bishop *(Laboratory Medicine)*

Professorial Lecturers P.D. Olch *(History of Medicine)*, Tatiana Antonovych

Associate Professors W.L. Marsh, Alexander Breslow, F.S. Jannotta, L.S. Lessin *(Hematology)*, W.A. Burns, R.B. Lingeman, Nirmal Saini

Associate Clinical Professors V.E. Martens, R.E. Palmer, W.J. Jaffurs, M.A. Weinberger, C.B. Cook, H.A. Schwamm, A.D. Cramer *(Blood Banking)*

Assistant Professors S.G. Kent, Suzanne Hammersberg *(Medical Technology)*, B.C. Zook *(Comparative)*, J.G. Guccion, Jocelyn Hicks, F.P. Abramson *(Research)*

Assistant Clinical Professors W.F. Enos, Marjorie Williams, D.R. Parkinson, I.D. Godwin, F.M. Garner *(Comparative)*, Gloria Brennan, F.R. Robinson *(Comparative)*, Ann Baumhofer *(Clinical Microbiology)*, V.C. Heath *(Hematology)*, J.W. Howell (*Clinical Chemistry*), P.P. Sher (*Chemistry*), B.D. Blackbourne (*Forensic*)

Clinical Instructors C.R. Lissner *(Clinical Microbiology)*, M.L. Pratt *(Blood Banking)*, Milo Prodanovich *(Clinical Chemistry)*, R.L. Dixon *(Hematology)*

Special Lecturers L.C. Johnson, Roma Chandra

Associate in Science (Medical Laboratory Techniques).—See pages 77–78.

Bachelor of Science in Medical Technology.—Prerequisite: the Medical Technology Curriculum I or II, pages 76-78.

Required: the general requirements, pages 82-83. The program of studies is outlined on pages 87-88.

Master of Science in the field of Anatomic Pathology.—Prerequisite: a Bachelor's degree from an accredited college or university. The undergraduate program should have included the following: (1) Biology—8 semester hours, including 4 hours of laboratory (this may be either in general biology or zoology but may not include separately credited courses in botany); (2) Chemistry—8 semester hours of general inorganic chemistry, including 4 semester hours of laboratory, and 6 semester hours of organic chemistry, including laboratory; (3) Physics—8 semester hours, including at least 2 hours of laboratory. Courses in embryology, microbiology, histology, genetics, and mathematics would also be useful.

Required: the general requirements, pages 92-99. The program of study consists of 45 semester hours of graduate work and must include the following: Anat 201, Path 201, 205, 210, 215, 277, 281, and 299-300 *(Thesis Research)*.

Doctor of Philosophy in the field of Pathology.—Prerequisite: one of the following degrees from a recognized professional school: Doctor of Medicine (M.D.), Doctor of Veterinary Medicine (D.V.M.), or Doctor of Dentistry (D.D.S.). In exceptional cases, applicants with other backgrounds in the life sciences may be accepted.

Required: the general requirements, pages 92-96, 99-101, including 48 semester hours of approved graduate course work and a minimum of 24 semester hours of dissertation research. One year of experience in pathology at the University Hospitals, equivalent to Path 283, may be counted for a maximum of 24 semester hours of graduate course work. Other experience must satisfy the eligibility requirements of the appropriate national certifying body, i.e., the American Board of Pathology

the case of the M.D., the American Board of Veterinary Pathology in the case of the D.V.M., and the American Board of Oral Pathology in the case of the D.D.S. *Research fields:* Comparative Pathology, Human Pathology, Ophthalmic Pathology, and Veterinary Pathology.

*1 **Introduction to Medical Technology** (6) Marsh, Hammersberg, and Staff

Lecture and laboratory to acquaint the student with hospital laboratory basics prior to hospital experience.

*11 **Clinical Chemistry I** (7) Marsh, Hammersberg, and Staff

Lectures and hospital-based laboratory covering principles, clinical correlation, and performance of various chemistry procedures. V.A. Hosp.

*21 **Clinical Microbiology I** (7) Marsh, Hammersberg, and Staff

Lectures and hospital-based laboratory covering principles, clinical correlation, and performance of the various microbiological and serological procedures. V.A. Hosp.

*31 **Hematology I** (7) Marsh, Hammersberg, and Staff

Lectures and hospital-based laboratory covering principles, clinical correlation, and performance of various hematological and urinalysis procedures. V.A. Hosp.

*41 **Blood Banking I** (4) Marsh, Hammersberg, and Staff

Lectures and hospital-based laboratory covering principles, clinical correlation, and performance of various blood banking procedures. V.A. Hosp.

†111 **Clinical Chemistry II** (4) Marsh, Hammersberg, and Staff

Lectures, demonstrations, and laboratory in advanced aspects of medical chemistry, including interpretation of data.

‡115–16 **Introduction to Medical Science** (1–1) Marsh, Hammersberg, and Staff

Lectures on physiology, pathology, and medicine to accompany Path 119-20. (Academic year)

‡117–18 **Principles in Medical Technology** (4–4) Marsh, Hammersberg, and Staff

Theories, principles, sources of error of methods used in clinical chemistry, clinical bacteriology, serology, hematology, clinical microscopy. (Academic year)

‡119–20 **Medical Technology Laboratory** (10–10) Marsh, Hammersberg, and Staff

Rotation through University Hospital pathology laboratories: hematology and urinalysis, 12 weeks; chemistry 16 weeks; bacteriology and parasitology, 12 weeks; blood bank, 6 weeks; serology, 4 weeks. (35 hours a week for 50 weeks)

†121 **Clinical Microbiology II** (4) Marsh, Hammersberg, and Staff

Lectures, demonstrations, and laboratory. Emphasis on advanced laboratory methods for the study of infectious diseases and their interpretation.

Open only to second-year students in Medical Technology Curriculum II.
Open only to students in Medical Technology Curriculum II leading to the degree of Bachelor of ence in Medical Technology.
Open only to students in Medical Technology Curriculum I leading to the degree of Bachelor of ence in Medical Technology

*131 **Hematology II** (4) Marsh, Hammersberg, and Staff

Lectures, demonstrations, and laboratory. The blood in health and disease, including morphological and functional disorders.

*141 **Blood Banking II** (4) Marsh, Hammersberg, and Staff

Lectures, demonstrations, and laboratory. Emphasis on problems in relation to a blood transfusion service and a blood donor center.

*151 **Hospital Laboratory Rotation** (15) Marsh, Hammersberg, and Staff

Experience in the various laboratories of the Division of Laboratory Medicine of the Department of Pathology of the University Hospital: clinical chemistry, 8 weeks; clinical microbiology, 8 weeks; hematology, 4 weeks; blood bank, 4 weeks.

†201 **Pathology** (8)

A general introduction to concepts of disease. Pathology of organ systems; correlation with symptoms and physical signs. Gross and microscopic study of diseased tissues. Case studies. (Fall)

‡205 **Comparative Pathology I** (3)

An introduction to the study of disease in vertebrates, and comparison with disease in man. Mechanisms by which various agents provoke illness; body defensive reactions. Illustration of common diseases of various species, including material from captive wild animals. Recommended courses in anatomy, histology, and physiology. (Fall)

†210 **Comparative Pathology Laboratory** (2)

Special assignments for dissection and study, including study of common diseases of captive wild animals. Path. Lab., Nat'l. Zoological Park (Fall)

†215 **Perinatal Pathology Laboratory** (2)

Special assignments for dissection and study. (Fall)

†262 **Problems in Experimental Cellular Pathology** (1)

Cytological and biochemical aspects of cellular function in relation to normal and selected pathological conditions. (Spring)

†266 **Comparative Pathology II** (1)

Participation in an autopsy service involving wild animals in captivity and comparison of diseases in various animal species with those in man. Limited to 4 students. Path. Lab., Nat'l. Zoological Park (Spring)

†271 **Tissue Reactions to Drugs** (1)

Study of the problems involved in recognizing instances of untoward reaction to therapy. Case presentations. (Spring)

†277 **Anatomic Pathology Clerkship I** (arr.)

A practical course in gross human anatomy and pathology. Prerequisite: Anat 201 or equivalent. Students may spend up to 24 weeks full-time in the necropsy and surgical pathology services, receiving 1 semester hour of credit for each 4-week period. Univ. and V.A. hosps. (Spring)

* Open only to students in Medical Technology Curriculum II leading to the degree of Bachelor of Science in Medical Technology.
† Open to limited number of graduate students, with permission.
‡ An interdepartmental course offered by the departments of Pathology and Biological Sciences.

*281 **Anatomic Pathology Clerkship II** (arr.) Staff

A practical course in gross and microscopic human pathology. Prerequisite: Path 201 or equivalent. Students may spend up to 24 weeks full-time on the necropsy and surgical pathology services, receiving 1 semester hour of credit for each 4-week period. Univ. and V.A. hosps. (Spring)

*283 **Anatomic Pathology Clerkship III** (arr.) Staff

Necropsy and surgical pathology service. Prerequisite: Path 201. Five semester hours of credit for each 4-week period. Students may receive up to 30 semester hours of credit for 6 months full-time. (Fall or spring)

295 **Comparative Pathology III** (arr.) Robinson, Zook, Sauer

Participation in veterinary pathology service, including wild and domestic animals. Prerequisite: Path 201, 283. Five semester hours of credit for each 4-week period. Students may receive up to 30 semester hours of credit for 6 months full-time. Path. Lab., Nat'l. Zoological Park, and Armed Forces Inst. of Path. (Fall or spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Pharmacology

Professors H.G. Mandel (*Chairman*), V.H. Cohn, Jr., Paul Mazel, S.E. Fabro (*Research*), E.B. Truitt, Jr. (*Research*)
Professorial Lecturer F.E. Hahn
Associate Professors K.S. Kim (*Research*), J.A. Straw, Philip Klubes
Assistant Professors Barbara Roth-Schechter, G.S. Edwards, F.P. Abramson (*Research*), H.C. Harder, J.W. Dailey
Special Lecturer P.J. Creaven

Master of Science in the field of Pharmacology.—Prerequisite: a Bachelor of Arts or Bachelor of Science degree. The undergraduate program must have included the following courses, or equivalent: B Sc 11–12; Phys 1, 2; Chem 11–12, 22, 151–52, 153–54. One year of calculus and a course in physical chemistry are normally recommended but may be taken during the work toward the Master's degree.
Required: the general requirements, pages 92–99, including Bioc 221–22; Phyl 201; Phar 201, 299–300. The remaining courses may be selected from Bioc 224, 227, 232, 241, 252, 260, 266; Chem 156, 251–52, 257; Micr 201, 225, 226, 230, 233, 257, 258; Phar 254, 256, 267, 269, 272, 275–76, 277–78, 279, 281, 282, 283, 295.
Doctor of Philosophy in the field of Pharmacology.—Required: the general requirements, pages 92–96, 99–101.

*Open to limited number of graduate students, with permission.

Research fields: Biochemical Pharmacology, Chemotherapy and Molecular Pharmacology, Developmental Pharmacology, and Physiological Disposition of Drugs.

115 **Drug Abuse Education** (3) Cohn and Staff

Offered off campus through the College of General Studies. Psychological and sociological bases of drug abuse, pharmacological and toxicological aspects of drug action on both the brain and peripheral organ systems, legal and societal implications of and reactions to drug abuse. Lectures and discussions on alcohol, narcotics, central nervous system stimulants and depressants, marijuana and other hallucinogenic and psychedelic drugs. (Fall and spring)

201 **Pharmacology** (8) Mandel and Staff

Lectures, laboratory, conferences on interaction of drugs and biological systems as a basis for rational therapy of disease. Prerequisite: biochemistry and physiology, or approval of Department. (Fall and spring)

Staff

203 **Fundamental Principles of Pharmacology** (2)

Basic principles of pharmacology, including drug receptor interactions, structure activity relationships, pharmacokinetics, membrane phenomena, cellular control mechanisms, drug toxicity. (Fall)

215 **Adolescent Drug Abuse** (3 or 4) Cohn and Staff

Offered off campus through the College of General Studies. Multidisciplinary lectures and discussions concerning the physiological and psychological effects of narcotics, central nervous system stimulants and depressants, alcohol, and hallucinogenic and psychedelic drugs; psychosocial factors leading to adolescent drug abuse; legal implications of drug abuse; prevention, control, and treatment of drug abuse. (Fall and spring)

Staff

252 **Seminar: Clinical Pharmacology** (2)

Problems in therapeutics; emphasis on drugs used in treatment of cardiovascular and infectious diseases. Enrollment limited. (Spring 1975 and alternate springs)

254 **Frontiers in Pharmacology** (1) Mandel and Staff

Recent advances and fields of research in pharmacology. Presentations by laboratory scientists from neighboring institutions. (Spring)

Staff

256 **Molecular Pharmacology** (2)

Current theory on action of drugs, especially chemotherapeutic agents, at molecular level. Effect of drugs on biosynthetic processes of the cell with respect to DNA, messenger RNA, transfer RNA, ribosomes, protein, cell wall, and intermediary metabolites. Factors which alter action of drugs such as drug interactions and resistance. (Spring)

258 **Cancer Chemotherapy** (1) Mandel and Staff (Spring

Mechanisms by which drugs inhibit the growth of tumor cells. (Spring 1974 and alternate springs)

Staff

259 **Developmental Pharmacology** (1)

Lectures, seminars, conferences. Teratogenic actions of drugs; pharmacological principles which apply during prenatal and perinatal development. (Spring 1974 and alternate springs)

260 **Endocrine Pharmacology** (1) Kim

Lectures and seminars on recent advances in the pharmacology and mechanisms of action of various hormones. (Spring 1975 and alternate springs)

267 **Pharmacological Research** (arr.) Staff

Research with staff members. May be repeated once for credit toward a Master of Science degree. (Fall and spring)

269 **Pharmacology Seminar** (1) Staff

Recent advances in pharmacology. Content differs each time the course is offered; may be repeated once for credit. (Fall and spring)

272 **Physiological Disposition of Drugs** (3) Cohn

Fate of drugs in biological tissue. Absorption, distribution, chemical alteration, excretion of drugs; physical, chemical, and biological factors affecting these processes. Limited to 20 students. Prerequisite: Phar 201. (Spring 1974 and alternate springs)

275–76 **Advanced Topics in Pharmacology I-II** (1–1) Staff

Lectures and seminars on advances in mechanisms of drug action, pharmacology of new drugs, theoretical aspects of pharmacology, laboratory techniques. (Academic year 1973–74 and alternate years)

277–78 **Advanced Topics in Pharmacology III-IV** (1–1) Staff

Continuation of Phar 275–76. (Academic year 1974–75 and alternate years)

279 **Special Topics in Pharmacology** (arr.) Staff

Selected aspects of drug action. Content differs each time the course is offered; may be repeated once for credit. (Fall and spring)

281 **Physiological Techniques in Pharmacology—Lecture** (2) Mazel, Straw

Physiological techniques for obtaining information on mechanism and site of action of pharmacological agents. Limited to 20 students. Phar 281 may be taken without 282. Prerequisite: Phar 201. (Spring 1974 and alternate springs)

282 **Physiological Techniques in Pharmacology—Laboratory** (2) Mazel, Straw

Accompanies Phar 281. Prerequisite: Phar 201. Prerequisite or concurrent registration: Phar 281. (Spring 1974 and alternate springs)

283 **Biochemical Techniques in Pharmacology** (arr.) Cohn

Lecture and laboratory. Theory and practice of modern biochemical techniques applicable to study of metabolic fate and mechanism of action of drugs. Prerequisite: Phar 201. (Fall or spring)

295 **Reading and Research** (arr.) Staff

Independent study for students preparing for the Master of Science degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Philosophy

Professors Thelma Z. Lavine (*Chairman*), R.H. Schlagel
Associate Professors C.H. Pfuntner, W.B. Griffith
Associate Professorial Lecturer Laura Schrenk
Assistant Professor Walter Soffer

Bachelor of Arts with a major in Philosophy (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)

2. Required courses in related areas—6 semester hours of literature courses selected from Chinese, Classics, English, French, German, Italian, Slavic, or Spanish (Clas 71, 72, or Engl 91–92 recommended); 6 hours selected from Art History, Music History and Literature, or Religion; 6 hours in History (Hist 39–40 or 91–92 recommended).

3. Required courses in the major—Phil 111, 112, 113; 9 semester hours selected from Phil 121, 131, 151, 152; 6 semester hours selected from Phil 172, 192, 193, plus 6 additional semester hours of second-group Philosophy courses.

For students expecting to continue in graduate school, it is recommended that they include in their program of study 12 semester hours of introductory French, German, or Greek language courses.

Master of Arts in the field of Philosophy.—Prerequisite: a Bachelor's degree with an undergraduate major in Philosophy at this University, or an equivalent degree. The undergraduate program should have included the following courses or their equivalent: Phil 111, 112, 113, 121, 131, and 152.

Required: the general requirements, pages 92–99. The program of study consists of a minimum of 30 semester hours of second- and third-group courses with a thesis without a thesis. A Master's Comprehensive Examination is required in two areas of philosophy: the History of Philosophy; Problems of Philosophy and Contemporary Philosophy.

FIRST GROUP

50 **Introduction to Philosophy** (3)
Readings from major philosophers and study of philosophic positions from Plato to the present. (Fall and spring)

71 **Philosophy and Literature** (3)
Philosophical foundations of psychoanalytical psychiatry, existentialism, and Marxism and their expression in literature, e.g., in the works of Mann, Kafka, Camus, Sartre, Hesse, and Koestler. (Spring)

SECOND GROUP

111 **History of Ancient Philosophy** (3)

History of Western philosophy from early Greece to the early Middle Ages. (Fall)

112 **History of Modern Philosophy** (3) Pfuntner

History of Western philosophy of the 17th and 18th centuries (Descartes to Kant). (Spring)

113 **19th Century Philosophy** (3) Lavine

European philosophy from Kant to Nietzsche. (Fall)

121 **Introduction to Symbolic Logic** (3) Griffith

Systematic study of the principles of valid inference with attention to the development of skill in logical analysis and evaluation of arguments, and to the elementary theory of formal systems. (Spring)

*127 **Theories of History** (3) Lavine

Critiques of philosophies of history: idea of progress, historicism, Hegelian-Marxian dialectic, cyclical and social-scientific views. Contemporary problems of historical knowledge. (Fall)

131 **Ethics** (3) Griffith

Theories of "the good" and "the right" from Plato to Sartre. (Fall)

132 **Social Philosophy** (3) Lavine

Social philosophies from Luther to Marxism and Fascism. (Spring)

142 **Philosophy of Law** (3)

Systematic examination of the fundamental concepts of law and jurisprudence; special emphasis on their treatment by contemporary philosophers and jurists.

151 **Myth, Science, and the Modern Mind** (3) Schlagel

Comparison of the mythical and scientific outlook; emphasis on the development and nature of scientific concepts, methodology, and explanation from Copernicus to Einstein. (Fall)

152 **Knowledge, Truth, and Reality** (3) Schlagel

Inquiry into the basis and structure of knowledge, the problem of perception and independent reality, and the meaning and criteria of truth. (Spring)

162 **Aesthetics** (3) Pfuntner

Nature of aesthetic experience, problems of appreciation and criticism in the arts, and theories of artistic creation. Emphasis on contemporary arts and criticism. (Spring)

172 **American Philosophy** (3) Pfuntner

Philosophies of Peirce, Royce, James, Dewey, and Santayana as representatives of American thought. (Fall)

*An interdepartmental course offered by the departments of Philosophy and History.

192 **Contemporary Philosophy: Analytical** (3) Schlage
The two dominant movements of recent Anglo-American philosophy, logi-
cal positivism and British ordinary language philosophy, as represented
by Russell, G. E. Moore, Wittgenstein, Ryle, Ayer, etc. (Fall)

193 **Contemporary Philosophy: Phenomenological** (3) Griffith
The phenomenological movement, including its development into German
and French existentialism, and its more recent phases. (Fall)

THIRD GROUP

201–2 **Readings and Research** (3–3) Staff
Advanced readings and reports. Investigation of special problems.
(Academic year)

210 **Seminar: Ancient Philosophy** (3)
Content differs each time course is offered; may be repeated for credit

216 **Seminar: Kant** (3) Schlage
Critique of Pure Reason. (Spring 1975 and alternate springs)

221 **Seminar: Logical Theory** (3) Griffith
Metatheory of deductive systems, modal logics; historical and philosophi-
cal import of recent developments. (Spring 1975 and alternate spring

231 **Seminar: Ethical Theory** (3) Griffith
Readings in recent ethical philosophy.

251 **Seminar: Philosophy of Science** (3) Schlage
Intensive study of selected problems in the historical and theoretical foun-
dations of science. (Spring)

252 **Seminar: Epistemology** (3) Schlage
Study of selected problems.

262 **Seminar: Aesthetics** (3) Pfunte
Study of selected problems.

272 **Seminar: American Philosophy** (3) Pfunte
Important American contributions to theories of the self, society, and his-
tory. (Fall) Lavi

280 **Seminar: Philosophy of History** (3)
Current issues concerning the problems of historical knowledge. Sp

299–300 **Thesis Research** (3–3)
(Fall and spring)

Physical Education, Health, and Recreation

Professors R.G. Hanken, V.J. DeAngelis, Loretta Stallings, J.L. Breen (*Chair-
man*), Donald Hawkins (*Research*)

Professorial Lecturers W.D. Thompson, Margie Hanson, S.A. Fine
Associate Professors Lyndale George, Jeanne Snodgrass, Maida Withers, S. Leigh Clark
Associate Professorial Lecturers Evelyn DeBoeck, Mike Millan
Assistant Professors Honey W. Nashman, Nancy Johnson
Assistant Professorial Lecturers Barbara Katz, S.Y. Cha
Lecturer Calva Collier

Programs of study leading to the degrees of *Bachelor of Science in Physical Education* (opportunity for specialization in elementary and secondary school physical education or dance), *Master of Arts in Education* (field in Physical Education with opportunity for specialization in adaptive physical education, dance, elementary or secondary school physical education, therapeutic recreation, tourism and development, and urban recreation administration) are offered by the School of Education (see pages 104–30).

This Department includes all the recognized sport and dance activities of University students except intercollegiate athletics for men.

From 3 to 4 semester hours of first-group Physical Education, Health, and Recreation courses are required for Bachelor's degree candidates in the education and physical education curriculum in Columbian College of Arts and Sciences.

A medical examination is required before participation in physical education activities.

The University is not responsible for injuries received in intramural games or in any of the activities of the Department of Physical Education, Health, and Recreation, and the student assumes full responsibility therefor.

FIRST GROUP

Courses numbered from 1 to 49 are beginning activities courses and require a minimum of 24 clock hours of instruction.

Courses numbered from 50 to 100 are for students who wish in-depth training in a particular activity. They require a minimum of 48 clock hours of instruction.

A physical education activities fee of $4.50 a semester is required for registration in one or more of the activity courses (numbered 1 to 100).

Students whose medical examinations indicate the desirability for remedial or restricted activity are assigned to programs especially adapted to their needs.

Unless otherwise indicated, all first-group courses are offered both in the fall and spring semester.

All first-group courses may be repeated with permission of the instructor.

10 **Beginning Badminton** (1) Breen

11 **Beginning Bowling** (1) DeAngelis

12 **Introduction to Ballet** (1) (Spring only) Johnson

13 **Beginning Ballet Technique** (1) Johnson

14 **Intermediate Ballet Technique** (1) Staff

15 **Intermediate/Advanced Ballet Technique** (1) Johnson

16 **Introduction to Modern Dance** (1) (Fall only) Withers

17 **Beginning Modern Dance Technique** (1) Withers

18 **Intermediate Modern Dance Technique** (1) Staff

19 **Folk Dance** (1) Johnson

20 **Beginning/Intermediate Golf** (1) DeAngelis

21 **Foil Fencing** (1) Snodgrass

22 **Basketball** (1) (Men only) Hanken

23 **Touch Football** (1) (Men only) (Fall only) Hanken

24 **Volleyball** (1) Hanken

25 **Softball** (1) (Spring only) Georg

26 **Karate (Korean Style)** (1) Staff

27 **Beginning Tennis** (1) Georg

28 **Intermediate Karate (Korean Style)** (1) Staff

29 **Yoga** (1) Staff

50 **League Bowling** (2) DeAngelis

Emphasis on competitive bowling as a lifetime sport.

51 **Gymnastics** (2) Staff

Emphasis on apparatus and trampoline.

52 **Intermediate/Advanced Modern Dance Technique** (2) Withers

Admission by permission of instructor.

53 **Advanced Modern Dance Technique** (2) Staff

54 **Intermediate/Advanced Tennis** (2) Georg

Development of skills, theories of strategy; emphasis on competitive pla as a lifetime sport.

57 **Intermediate/Advanced Badminton** (2) (Spring only) Bree

SECOND GROUP

101 **Physical Education in the Elementary School** (3) Snodgrass

For Elementary Education and Physical Education majors. Child growth and development related to school and playground programs in move ment. Philosophy, curriculum, techniques of teaching, and equipment evaluation. (Fall)

102 **Movement Education** (3) Snodgrass

Technique of teaching movement education with emphasis on problem solving methods for kindergarten and grades 1–6. Prerequisite: PE 10 or permission of instructor. (Spring)

103 **Professional Foundations and Concepts of Physical Education, Dance, Recreation, Health, and Athletics** (3) Staff

Orientation to professional competencies; basic philosophy as it relate to the school, recreation agencies, and professional associations. (Fall)

105 **Adaptive Physical Education and Recreation** (3) Nashman

Corrective, developmental activities for the handicapped—orthopaedic, neurological, cardiovascular, and mentally retarded. Clinical experience. (Fall)

106 **Introduction to Dance Therapy** (3) Staff

General survey of dance therapy areas from theoretical and experimental points of view. Exploration of professional opportunities.

107 **Teaching Ethnic Dance** (2) Johnson

Methods and materials for teaching the folk and social forms of dance. (Spring)

108 **Dance Improvisation** (2) Withers

Awareness of body movements, environment, group dynamics, performance, and composition through improvisational technique. (Fall and spring)

109–10 **Dance Composition** (3–3) Withers

PE 109: basic elements and principles of composition. PE 110: advanced problems in composition. (Academic year)

111–12 **Sports Education Technique** (3–3) Staff

Techniques for teaching individual, dual, and team sports. (Academic year)

113–14 **Field Experience: Practicum in Physical Education** (3–3) Staff

Pre-practice teaching in elementary or secondary school physical education and adaptive physical education. Seminars relating to field experiences. (Academic year)

116 **Movement for Actors** (1) Staff

Movement exploration and body awareness through dance technique and improvisation.

117 **Techniques of Teaching Dance** (3) Clark, Johnson

(*Formerly Teaching Modern Dance*)

Organizational and conceptual approaches to the teaching of dance in academic and institutional settings. Admission by permission of instructor. (Fall)

118 **Special Problems in Dance Composition** (1) Staff

Exploration of effect of time, space, and energy upon movement, developing into group and solo composition.

119 **Creative Dance for Children** (3) Withers

Study of dance as an expressive medium for children; emphasis on concepts and principles, methods and materials. Consideration given to dance for children with special education problems. (Spring)

120 **Repertory** (1 or 2) Johnson

Study and performance of dance works. Admission by permision of instructor. May be repeated for credit not to exceed 4 semester hours. (Fall and spring)

121 **Dance Technique I** (1) Staff
Intermediate/advanced modern dance. May be repeated once for credit.
(Fall and spring)

122 **Methods and Materials for Health Education** (3) Stallings
Conceptual approach to curriculum design and teaching, including planning and organization, methodology, selection and use of materials, and evaluation; basic health knowledge. (Fall and spring)

123 **Dance Technique II** (1 or 2) Withers
Advanced modern dance. May be repeated for credit not to exceed 4 semester hours. (Fall and spring)

129 **Introduction to Motor Learning** (3) Stallings
Concepts of motor skill learning; variables of motor performance and learning with implications for teaching movement skills. (Spring)

130 **Motor Performance in Childhood** (3) Snodgrass
Study of the evolvement and refinement of fundamental movement skills.
(Spring)

134 **Rhythmic Theory for Dancers** (1) Johnson
(Formerly Rhythmic Analysis through Creative Movement (3))
Introduction to and training in rhythmic principles of music theory.
(Fall)

135–36 **Dance History** (3–3) Clark, Johnson
Study of dance from antiquity to present; emphasis on cultural significance of dance as art form, symbolic form, and social behavior. PE 135: antiquity to classical period. PE 136: 20th century. (Academic year)

137 **Dance Notation** (3) Katz
Survey of systems of notation; concentration on the work of Rudolf Laban. (Spring)

138 **Physical Education Curriculum and Administration** (3) George
Curriculum and administration in physical education. Professional ethics.
(Fall)

139 **Teacher Behavior** (2 or 3) Breen
Teacher behavior analyzed in relation to motives, attitudes, and expectations. Integration of structure, psychological processes, and behavior emphasized for a more thorough understanding of the adjustment processes. (Spring)

141–42 **Dance Production** (2–2) Johnson
Theories and practicum in technical aspects of production. PE 141: lighting, sound, and media. PE 142: theatre management, costuming, sets.
(Academic year)

144 **Choreography** (2) Withers
Solo and group. (Fall and spring)

150 **Human Anatomy** (3) Stalling
Systematic study of the structure of the human body; emphasis on

kinesiological anatomy, including joints, muscles, and neuromuscular integration. (Fall)

151 **Kinesiology** (3) Staff

Analysis of human movement, including mechanical physics, anatomy, and physiology. Prerequisite: approved course in anatomy. (Spring)

152 **Environment, Leisure, and Quality of Life** (3) Hawkins

Environmental problem-solving through ecological and social planning; concentration on the impact of leisure on man's total physical and cultural development. (Fall)

156 **Application of Recreational Skills to Urban Living** (2 or 3) George

Planning and participation in urban recreation; emphasis on local opportunities for recreational activities. Current trends in urban development and land-use planning and their impact on recreational facilities. (Fall and spring)

157 **Dance Technique and Theory** (2) Withers

Theories of movement; analysis and practice of contemporary dance techniques. Individual application. (Fall)

158 **Safety Education** (3) Millan

Liability, prevention, and emergency care of all types of injuries with reference to first aid and athletics. Proper use of personnel, facilities, and equipment. (Fall)

164 **Physiology of Exercise** (3) Staff

The physiological functions of the body and the effect of exercise on these functions. Prerequisite: PE 150 or permission of instructor. (Spring)

170 **Problems Seminar** (3) George

Content differs each time course is offered, according to current issues, professional policies, and practices. May be repeated for credit. (Spring)

171 **Current Professional Literature** (2 or 3) Snodgrass

Study of current and basic education literature with implications for physical education, utilizing retrieval systems. (Fall)

172 **International Experiences** (1 to 6) Staff

Special travel to foreign countries to study programs with implications for American education.

173 **Independent Study** (1 to 3) Staff

Individually designed model for intensive study in an area of special interest. Prerequisite: demonstrated competency for independent work and permission of adviser and instructor. (Fall and spring)

175 **Dance Accompaniment** (3) DeBoeck

Analysis of music composition and notation. Accompaniment for the dance. Resources in music for dance. Prerequisite: PE 134 or knowledge of rhythmic theory. (Spring 1974 and alternate springs)

184 **Workshops in Physical Education** (1 to 3) Staff
(*Replaces former PE 180, 181, and 182*)
Special workshops involving current problems, practices, and new approaches. Content of each workshop will depend on current needs of schools and teachers.

THIRD GROUP

201 **Philosophic Foundations of Physical Education and Recreation** (3) Breen
(Formerly Philosophy and Organization of Physical Education)
Concepts of philosophy and research method applied to objectives and practices in physical education and recreation. (Spring)

202 **Conceptual Basis of Motor Learning** (3) Stallings
Theories of learning and application to development of motor skills. (Spring)

205 **Diagnostic-Prescriptive Techniques: Perceptual-motor Domain** (3) Stallings
Understanding and application of perceptual-motor theories, psychophysical testing, and clinical practice. (Spring)

211 **Problems and Modern Trends in Physical Education** (3) Breen
Lecture (2 hours), conference (1 hour). For experienced teachers. Organization, supervision, and curriculum problems growing out of current issues; program planning policies; competition. Staff

220 **Problems in Health Education** (3)
Lecture (2 hours), conference (1 hour). Health needs, policies and program planning, use of community resources, promising practices in the field. (Fall) Staff (Fall

230 **Movement Analysis** (3) 27
Scientific analysis of fundamental movement and sports skills. Hanson
1974 and alternate falls)

232 **Current Issues in Elementary School Physical Education** (3) 27
Current philosophy, trends, and research; implications for curriculum, instruction, evaluation. (Spring) Hanson

234 **Organization and Administration of Elementary School Physical Education** (3) 27
For school administrators, supervisors, principals, and physical education specialists. Curriculum, administrative, and supervisory problems; kindergarten, grades 1–6. (Spring) Hawkins

239 **Urban Recreation for Special Populations** (3) 27
Development of recreation for the disabled, impaired, and handicapped using the Baltimore-Washington area as the urban problem setting; development of competencies in community organization, communication, consultation, group dynamics, and interpersonal relations; program development and evaluation. (Spring)

* Dr. J. P.

240 **Physical Education for the Handicapped** (3) Breen and Staff

Adaptive physical education for handicapped populations; development of competencies in diagnostic/prescriptive teaching, program design and evaluation, consultation, and communications. (Fall)

244 **Therapeutic Recreation Practice** (3) Hawkins and Staff

Professional competencies for delivery of services to the handicapped, disabled, impaired; public and private setting for service delivery; client assessment and counseling techniques; basic special education, medical, and rehabilitation terminology; etiology of handicapping conditions as related to recreation. (Fall)

250 **Administration of Urban Leisure Services** (3) Thompson

Planning and organization of a comprehensive system of urban leisure services utilizing educational, cultural, and recreational resources; emphasis on public relations, personnel administration and supervision, systems analysis, fiscal management and managerial accountability. (Fall)

256 **Sports Medicine and Rehabilitation** (3) Naughton*

Theory and practice of therapeutic exercise and recreation as applied to the rehabilitation of the handicapped; injuries; preventive, adapted, and remedial concepts; research in area of general rehabilitation practice; professional roles as related to ancillary medical focus. (Spring)

260 **Tourism Development** (3) Hawkins

Socioeconomic analysis of demand for travel and tourism resources; techniques for planning and design; examination of current trends. (Spring)

270 **Philosophic Foundations of Dance** (3) Clark

(*Formerly Philosophy of Dance*)

Examination and discussion of problems in dance confronting the artist as well as the audience, in terms of dance as an art form and the creating and experiencing of that form.

271 **Dance Notation I** (3) Katz

Study and reconstruction of dance from dance literature; application of notation to dance curriculum; may lead to intermediate certification. Prerequisite: PE 137. (Fall)

272 **Dance Notation II** (3) Katz

Designed to meet individual interest and needs of the student at intermediate/advanced level of notation. Focuses on projects in notation and reconstructing dance works. Prerequisite: PE 271. (Spring)

Advanced Choreography (3) Staff

Advanced problems in creative movement and composition. Choreographing of group and solo works in dance. May be repeated once for credit. (Fall and spring)

Dance in Culture (3) Clark

Anthropological aspects of dance; its role and function as human behavior.

*Naughton is Professor of Medicine in the University's School of Medicine.

277 **Dance Expressions in Selected Cultures** (3 or 6) Clark
Investigation of traditional dance form through research and field work. Research may be conducted in the field or by use of other techniques. (Fall and spring)

280 **Advanced Workshop in Physical Education** (1 to 3) Staff
Study of contemporary practices in the field of physical education and recreation.

283 **Supervised Experience in Physical Education, Recreation, or Dance** (3 or 6) Staff
Field work, internship and/or instructional practice, including conference and/or seminar. May be repeated once for credit with permission of adviser. (Fall and spring)

296 **A Systems Approach to Human Resource Development** (3) Fine
Professional competencies through task analysis, job design, and curriculum development in the field of physical education and recreation. (Fall)

297 **Advanced Practicum and Topical Studies** (3) Staff
Independent research and study pertinent to the needs of the student. Prerequisite: Educ 295 or permission of instructor. May be repeated once for credit with permission of the adviser. (Fall and spring)

Physical Science

See "Chemistry."

Physics

Professors G.M. Koehl, H.H. Hobbs, Julian Eisenstein (*Chairman*), Otto Bergmann, A.J. Zuchelli, Francisco Prats
Assistant Professors N.K. Khatcheressian, W.C. Parke, M.F. Taragin, D.R. Lehman, D.D. Thornton

Bachelor of Arts or *Bachelor of Science with a major in Physics (Departmental).*—The following requirements must be fulfilled:
1. The general requirements as stated on pages 74–75, 82–87.
2. Prerequisite courses—Phys 1, 2; Phys 31–32 and 51–52, or Phys 40, 41, and 42; Chem 11–12; Math 31, 32, 33.
3. Required course in related area—Stat 97 or EE 51.
4. Required courses in the major—Phys 151 or 152, 161, 162, 163, 164, 165–66, 167, 168.

Master of Arts in the field of Physics.—Prerequisite: a Bachelor's degree with a major in Physics at this University, or an equivalent degree.
Required: the general requirements, pages 92–99, including Phys 231, 232, 233, 234, 235, 236, 299–300, plus *one* of the following: Phys 241, 242, 243, 244, 245, or 251–52.

Doctor of Philosophy in the field of Physics.—Required: the general requirements, pages 92–96, 99–101.

Research fields: Experimental Solid State Physics (Electrical Conductivity of Solids, Defects in Crystals, Magnetic Properties of Solids at Low Temperatures, Magnetic Resonance, Mössbauer Effect, Superconductivity), and Theoretical Physics (Elementary Particles, Field Theory, General Relativity, Magnetic and Optical Properties of Solids, Molecular Structure, Nuclear Scattering, Quantum Mechanics).

Bachelor of Arts in Education with a teaching field in Physics.—Prerequisite: the Education curriculum, page 78.

Required: the Physics option and the professional courses listed on pages 116, 119.

Departmental prerequisite: Phys 31–32, or 43, or equivalent, and consent of a Departmental adviser, are prerequisite to all second-group courses in Physics.

ASTRONOMY

FIRST GROUP

9–10 **Introduction to Astronomy** (3–3) Staff

Lecture (2 hours), recitation (1 hour), laboratory (2 hours). Classical through modern astronomy with introduction to basic principles underlying astronomical systems and observations. Primarily for nonscience majors. Laboratory fee, $11 a semester. (Academic year)

*11–12 **Introduction to Astronomy** (2–2) Staff

Same as Phys 9–10 without the laboratory. (Academic year)

PHYSICS

FIRST GROUP

1 **General Physics** (4) Staff

Topics in classical physics which form a foundation for modern physics. Prerequisite: two years of college preparatory mathematics or concurrent registration for Math 6. Laboratory fee, $11. (Fall and spring)

2 **Introduction to Modern Physics** (4) Staff

Selected topics in modern physics, including relativity and quantum theory. Prerequisite: Phys 1 or equivalent. Laboratory fee, $11. (Fall and spring)

†3 **General Physics** (3) Staff

Same as Phys 1 without laboratory. (Fall and spring)

‡4 **Introduction to Modern Physics** (3) Staff

Same as Phys 2 without laboratory. (Fall and spring)

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* This course may not be taken by students who have completed, or are enrolled in, or plan to enroll in Phys 9–10.

† This course may not be taken by students who have completed, or are enrolled in, or plan to enroll in Phys 1.

‡ This course may not be taken by students who have completed, or are enrolled in, or plan to enroll in Phys 2.

Staff

5 **Topics in Contemporary Physics** (3)

Discussion of current developments based on recent *Scientific American* articles in the physical sciences. Topics include relativity, quantum theory, elementary particles, lasers, Mössbauer effect, etc. Prerequisite: high school physics and two years of college preparatory mathematics.

6 **Energy and Entropy: from Lightning to Thermonuclear Power** (3)

The energy concept; energy conservation and power production. The entropy concept; its relation to disorder and information. Thermonuclear reactions and their potential use as an energy source. Prerequisite: high school algebra.

Staff

7 **Ideas of Physics—History and Analysis** (3)

The development of atomic theory and corresponding views of space and time are discussed. Physical phenomena which were relevant to the evolution of the atomic theory are treated in historical perspective. Prerequisite: high school algebra.

Staff

27 **Physics in Medicine** (3)

Principles of physics applied to biological systems: nerve pulse detection, photosensitive and acoustical receptors, circulation dynamics, bioenergetics, radiation and living matter. Physical principles behind operation of medical instruments. Prerequisite: Phys 2 or equivalent.

Staff

*31–32 **Introduction to Theoretical Physics** (2–2)

Theoretical structure of physics, emphasis on appropriate analytical techniques. Prerequisite: two semesters of calculus and Phys 2. (Academic year)

Staff

*40 **Physics for Scientists and Engineers I** (4)

First part of a three-semester sequence. Mechanics, radiation, and heat. Prerequisite: Math 31. Laboratory fee, $11. (Spring)

Staff

*41 **Physics for Scientists and Engineers II** (4)

Second part of a three-semester sequence. Mainly electricity and magnetism. Prerequisite: Phys 40. Laboratory fee, $11. (Offered for the first time fall 1974)

Staff

*42 **Physics for Scientists and Engineers III** (4)

Third part of a three-semester sequence. Modern physics, particularly quantum phenomena. Prerequisite: Phys 41. Laboratory fee, $11. (Offered for the first time spring 1975)

Staff

*51–52 **Introduction to Experimental Physics** (2–2)

Experiments and lectures on the basic phenomena of physics and techniques of experimentation. Prerequisite: Phys 2 and two semesters of calculus. Laboratory fee, $11 a semester. (Academic year)

* Phys 31-32 and 51-52 will be offered for the last time during the 1973-74 academic year. These courses are being replaced with a new sequence of courses, Phys 40, 41, and 42, with the first course in the sequence, Phys 40, being offered during the spring semester 1974.

SECOND GROUP

151–52 **Intermediate Laboratory** (2–2) Staff

Independent advanced work to introduce students to laboratory and shop techniques and the use of specialized instruments. Prerequisite: Phys 42 or 52. Laboratory fee, $11 a semester. (Academic year)

161 **Mechanics I** (3) Staff

Mechanics of mass points and rigid bodies. Newton's laws, conservation laws, Euler's equations, inertia tensor, small vibrations, and elements of Lagrange's and Hamilton's equations. (Fall)

162 **Mechanics II** (3) Staff

Basic aspects of elasticity and fluid dynamics, strain tensor, stress tensor, equations of equilibrium, elastic waves, ideal and viscous fluids. (Spring)

163 **Physical and Quantum Optics** (3) Staff

Oscillations and waves, energy and momentum of the electromagnetic field, interference, diffraction, geometrical optics, optics of crystals and other media, dispersion. (Fall)

164 **Thermodynamics** (3) Staff

Basic principles of thermodynamics, reversible changes, applications to simple systems, thermodynamic potentials, phase equilibrium. (Spring)

165–66 **Electromagnetic Theory** (3–3) Staff

Development of Maxwell's field equations using vector and tensor calculus, electrostatics, stationary and nonstationary phenomena, basic circuit theory, electromagnetic waves and radiation. (Academic year)

167 **Principles of Quantum Physics** (3) Staff

Experimental background and theoretical basis of quantum mechanics. (Fall)

168 **Applied Quantum Physics** (3) Staff

Applications of quantum mechanics to statistical mechanics and to atomic, molecular, and nuclear physics. (Spring)

170 **Elementary Solid State Physics** (3) Staff

Dielectric and magnetic properties of solids, behavior of electrons in metals and semi-conductors, lattice defects. (Spring)

175 **Nuclear Physics** (3) Staff

Structure and stability of atomic nuclei, nuclear transformations and reactions, radiations of nuclei, fission. (Fall 1974 and alternate falls)

THIRD GROUP

Consent of a departmental graduate adviser is required for admission to all third-group courses in Physics.

231 **Electromagnetic Theory: Macroscopic Effects** (3) Staff

Static boundary-value problems, multipoles, dielectrics, and macroscopic media, time-varying fields, plane electromagnetic waves. (Fall)

Staff

232 **Advanced Mechanics** (3)

Analytic methods of mechanics as a basis for modern theory: variational principles, Lagrange's equations, Hamiltonian formulation, canonical transformations, classical perturbation theory, transition to continuum. (Fall)

Staff

233–34 **Quantum Mechanics** (3–3)

General aspects of quantum mechanics with emphasis upon the developmental principles involved. Operators, representations and transformation theory, Schrodinger and Heisenberg pictures, angular momentum, perturbation theory, scattering theory. (Academic year)

Staff

235 **Special Relativity** (3)

Application of relativistic concepts to the basic fields of physics: space and time, tensors and covariant mechanics of point particles, covariant form of electromagnetism, relativistic variational principles, relativistic quantum equations. (Fall 1974 and alternate falls)

Staff

236 **Electromagnetic Theory: Electrodynamics and Radiative Effects** (3)

Wave guides, resonant cavities, simple radiating systems, covariant methods, radiation by moving charges, multipole fields, radiation damping. (Spring)

Staff

241 **Statistical Mechanics** (3)

Study of atomic configurations under thermodynamic conditions by use of partition functions and cluster expansion techniques; ideal and non-ideal gases; electron plasmas; changes of state. (Spring)

Staff

242 **Atomic and Molecular Structure** (3)

Structure of atoms and molecules, energy levels, binding energy, optical activity. Hartree and Hartree-Fock equations, spin-effects, rotational and vibrational effects, paramagnetic resonance, chemical binding. (Spring 1975 and alternate springs)

Staff

243 **Solid State Physics: Structure and Binding** (3)

Atomic structure of solids and analysis of the binding of crystals. Crystalline forms and symmetries, atomic vibrations and specific heats, sound and optical propagation, crystalline defects. (Fall 1973 and alternate falls)

Staff

244 **Solid State Physics: Electronic Processes in Metals** (3)

Phenomena in metals and semi-conductors determined by the electronic states allowed: binding, specific heats, magnetic properties, transport phenomena. Independent particle approximation and many-body aspects are discussed. (Spring 1974 and alternate springs)

Staff

245 **Quantum Electrodynamics: Theory and Applications** (3)

A presentation of the lower order effects depending upon the quantal nature of the electromagnetic field: Hamiltonian formulation and field quantization, perturbation calculations, Compton effect, photoelectric effect, electron-electron scattering, pair creation and annihilation, indices of refraction, divergence difficulties. (Fall 1974 and alternate falls)

246 **Quantum Field Theory** (3) Staff

Covariant presentation of general theory of quantized fields, Boson and Fermion fields, theory of S-matrix, dispersion relations, and renormalization program. (Spring 1975 and alternate springs)

247 **Nuclear Theory** (3) Staff

Nuclear interactions, nuclear models, theory of nuclear reactions, pion physics and weak interactions. (Spring 1974 and alternate springs)

248 **Elementary Particles** (3) Staff

Scalar, vector, and spinor fields and their particle aspects; weak and strong interactions; symmetry properties and conservation laws. (Spring 1974 and alternate springs)

249 **Statistical Processes** (3) Staff

Extension of statistical concepts to irreversible processes. Ergodic behavior, classical and quantum approaches to irreversible effects in large systems, master equations, recurrence paradox and development of thermodynamic concepts. (Fall 1974 and alternate falls)

250 **Selected Topics in Modern Physics** (3) Staff

Complements the established curriculum by affording formal instruction in topics of immediate interest to the development of physics and in particular to the members of the graduate research group. May be repeated for credit with permission of graduate adviser. (Fall and spring)

251–52 **Laboratory** (3–3) Staff

Individual work on special topics. Laboratory fee, $11 a semester. (Academic year)

254 **General Theory of Relativity** (3) Staff

Physical principles and mathematical methods underlying Einstein's field equation, geodesic equations of motion, checks of the theory, action principle, conservation laws, perturbation theory, gravitational radiation theory, relativistic cosmology. (Spring 1974 and alternate springs)

291 **Seminar** (1) Staff

Lectures on special problems in physics. May be repeated once for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Physiology

Professors C.S. Tidball, R.A. Kenney (*Chairman*), Elizabeth Tidball, Marie Cassidy
Professorial Lecturer Leonard Laster
Associate Professors M.J. Jackson, Michael McCally
Assistant Professors R.A. Lavine, D.W. Watkins
Assistant Professorial Lecturer I.P. Weiss
Special Lecturer L.L. Langley

Master of Science in the field of Physiology.—Prerequisite: a Bachelor's degree. No major is specified, but the undergraduate program must have included the following courses or equivalent: B Sc 11–12; Chem 11–12, 22, 151–52, 153–54; Math 31; Phys 1, 2.

Required: the general requirements, pages 92–99. In addition to the thesis, the 30 hours of required work should include Phyl 201, 221, 298, and at least 3 semester hours of research (Phyl 295).

Doctor of Philosophy in the field of Physiology.—Required: the general requirements, pages 92–96, 99–101. The program of study includes a major field in Physiology, a subfield (see below) in Physiology, and a minor field outside of Physiology leading to the Cumulative Examination. The 48 semester hours of required course work leading to the Cumulative Examination should include Bioc 221–22; Phyl 201, 221, 298, 396, 397; and a minimum of 8 semester hours each in two areas outside of Physiology in addition to the minor field.

Research fields and areas of study: Applied Physiology, Cardiovascular Physiology, Cellular Physiology, Endocrine Physiology, Gastrointestinal Physiology, Neurophysiology, Renal Physiology, and Respiratory Physiology.

Departmental prerequisite: Phyl 201 or equivalent is prerequisite to all courses in Physiology numbered above 201.

191 **Selected Topics in Human Structure and Function** (3) Kenney
Lecture (2 hours), laboratory (1 hour). Structural and functional basis of physiology. A required course for graduate students who have not had Anat 201 or equivalent. An undergraduate course; students may receive graduate credit on completion of additional work as prescribed by the instructor. Prerequisite: B Sc 11–12 or equivalent and consent of instructor. Open to Columbian College of Arts and Sciences students with the approval of the student's major adviser. (Fall) Staff

201 **Physiology** (8)
Lecture (8 hours), laboratory (2 hours), conference (1 hour). Cellular, organ system, and applied mammalian physiology. Prerequisite for graduate students: Anat 201 or Phyl 191, or equivalent; Bioc 201 or 221–22 (Bioc 222 may be taken concurrently); or consent of Chairman of Department. Open to Consortium students only with permission of Department Chairman. (Spring) Jackson

221 **Seminar** (1)
Staff and student presentations from literature. Present work discussed. experimental design and scientific deduction evaluated. Topics to be announced. Prerequisite: a reading knowledge of French or German. Content differs each time the course is offered; may be repeated for credit. (Fall and spring)

251 **History of Medicine** (1) E. Tidball
Survey of the great contributors to physiology and medicine in the context of the times in which they lived and worked. (Fall)

252 **Physiological Basis of Sexuality** (2) C. Tidball, E. Tidball
Conference and discussion on topics including communication, psychosexual development, physiological responses, homosexuality, population control and family planning, fertility and sterility, and other topics of interest to the class. (Fall)

253 **Physiology of Fluid Balance and Hydrogen Ion Regulation** (2) Staff
(*Formerly Clinical Applications of Physiology*)
Discussion on principles of fluid and acid-base balance and the application of these principles to scientific situations. (Fall)

261 **Gastrointestinal Physiology** (2) Staff
Lecture or conference 2 hours a week. Physiological approach to such clinical problems as peptic ulcer, malabsorption, ulcerative colitis, hepatitis, and others. (Fall)

262 **Topics in Cardiovascular Physiology** (2) Kenney
Survey, at an advanced level, of aspects of cardiovascular physiology especially as interrelated with the respiratory and renal systems. (Fall)

265 **Review of Endocrinology** (1) Jackson
Review of basic endocrinology. (Fall)

266 **Advanced Endocrinology** (2) Jackson
Review at an advanced level of selected topics in endocrinology and metabolism. Concurrent registration in Phyl 265 required. (Fall)

267 **Renal Physiology** (2) Kenney
Lecture or conference 2 hours a week. Overview of renal physiology at an advanced level.

268 **Computer Utilization in Physiology and Medicine** (2) C. Tidball
Lecture 1 hour a week, practical experience at student's convenience. Orientation to digital and analog mini-computers. Programming in several languages. Experience with one or more computers. No previous computer experience necessary. (Fall)

269 **Neurophysiology and Control Mechanisms** (2) Lavine
Selected topics in contemporary neurophysiology, including methods of data collection and analysis, control mechanisms involved in movement and behavior and sensory processing. Open to students in the School of Engineering and Applied Science with permission of instructor. (Fall)

270 **Electron Microscopy in Cellular Physiology** (1) Cassidy
Introduction to the applications of electron microscopy in the investigation of cellular physiology. (Fall)

273 **Investigative Electron Microscopy** (3) Cassidy
Lecture (2 hours), laboratory as arranged. Application of electron

microscopy to biological investigative studies. Limited enrollment. Prerequisite: Anat 261 or equivalent. Admission by permission of instructor. (Fall) Staff

295 **Research** (arr.)
By special arrangement with individual Staff members. Approximately 4 clock hours in the laboratory for each semester hour of credit. Content differs each time course is offered; may be repeated for credit. (Fall and spring) Staff

298 **Comprehensive Physiology** (arr.)
Guided review of selected areas of Physiology appropriate to the student's graduate program. This course satisfies the requirements for the Master's Comprehensive Examination, the Field Examination for doctoral students minoring in Physiology, and Part I of the Cumulative General Examination. Prerequisite or concurrent registration: Phyl 221. (Fall) Staff

299–300 **Thesis Research** (3–3)
(Fall and spring) Staff

396 **Advanced Reading and Research** (2)
Limited to students preparing for the Doctor of Philosophy general examination. Tutorial literature survey of a subfield of Physiology and of pertinent areas of the candidate's minor field. This course satisfies the requirement for Part II of the Cumulative General Examination in Physiology. (Fall and spring) Staff

397 **Development of Dissertation Problem** (2)
(Formerly Phyl 398)
Limited to students preparing for the Doctor of Philosophy general examination. Preparation for written and oral presentation of dissertation problems. This course satisfies the requirement for Part III of the Cumulative General Examination in Physiology. (Fall and spring) Staff

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Political Science

Professors R.E. Purcell, H.L. LeBlanc (*Chairman*), Benjamin Nimer, Andrew Gyorgy, H.C. Hinton, B.M. Sapin
Associate Professors J.A. Morgan, Jr., C.F. Elliott, Bernard Reich, Young Kim, C.A. Linden, S.J. Wayne, J.M. Logsdon
Adjunct Associate Professor Donald Robinson
Assistant Professors R.E. Darcy, J.M. Starrels, S.W. Burks, K.L. Storrs, H.R. Nau
Instructors Rachel Keith, Dana Fischer, R.L. Cole

Bachelor of Arts with a major in Political Science (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87.
2. Prerequisite courses—P Sc 4 and 6 or 5 and 6; Stat 51 or 53. (12 semester hours of introductory foreign language courses are recommended for students interested in political theory, comparative government, or international relations.)
3. Required courses in related areas—18 semester hours of social studies other than Political Science, including 6 hours of either Economics or History.
4. Required courses in the major—30 semester hours of second-group Political Science courses which must include 6 semester hours from each of Groups A, B, C, and D listed below. The 6 hours from Group A must include P Sc 105 (which should be taken no later than the second semester of the junior year); the 6 hours from Group B must include P Sc 103 or 104 or 122 or 145; the 6 hours from Group C must include P Sc 111 or 112; the 6 hours from Group D must include P Sc 171 or 181 or 182.

Group A: Political Theory and Methodology—P Sc 105, 107, 117, 118, 119, 120, 141, 160; *Group B:* American Government and Politics—P Sc 103, 104, 106, 108, 121, 122, 125, 126, 145, 146, 149, 150, 151, 167, 183, 184, 185, 186, 199, SPSc 153, 154, 155; *Group C:* Comparative and Foreign Government and Politics—P Sc 101, 111, 112, 115, 162, 163, 177, 179, 190, 191, 192, 193, 194; *Group D:* International Politics, Law, and Organization—P Sc 171, 172, 178, 179, 181, 182, 189, 197.

A student majoring in Political Science may not credit more than 12 hours of either Service-Learning courses or internships with their associated seminars toward his degree; no more than 6 hours of such courses may be credited toward the major.

Students in the 90-semester-hour degree program (see pages 83–84) must receive grades of *A* in at least 18 semester hours of second-group Political Science courses.

Political Science majors may apply for graduation with Special Honors. In order to be recommended by the Department for Special Honors, students must fulfill the general requirements (see pages 48–49) and must complete with distinction a project of independent study, as demonstrated in a written paper, in addition to the normal credit requirements of particular courses. A committee of the Department will review the paper and make the recommendation for Special Honors.

Students who wish to undertake independent study for Special Honors should register with the secretary of the Department *no later than the second week of each semester*, and then consult with a member of the Department whose specialized interests lie in the area of the proposed research project. Students registered for P Sc 150 may qualify for graduation with Special Honors by completing with distinction the work connected with their internship.

Master of Arts in the field of Political Science.—Prerequisite: a Bachelor's degree with a major in Political Science from an accredited college or university (or an equivalent degree), with high scholastic standing. The entering student must demonstrate competence in statistics equivalent to the satisfactory completion of an introductory course in Statistics.

Required: the general requirements, pages 92–99, including a reading knowledge of a modern foreign language or a specified level of knowledge in statistics. The choice of the foreign language, or of statistics in lieu of a language, must be made with the approval of the Department. With the approval of the Department, students may elect one of the following programs: (1) 24 semester hours of graduate course work plus a thesis (equivalent to 6 semester hours) and the satisfactory completion of a Master's Comprehensive Examination in three fields of political science (selected from the areas of study listed below under the Ph.D. program); or (2) 33 semester hours of graduate course work, including two research seminars (equivalent to 6 semester hours) without a thesis and the satisfactory completion of a Master's Comprehensive Examination in four fields of political science (selected from the areas of study listed below under the Ph.D. program).

Students in either the 30- or 33-semester-hour program must include in their

program of study P Sc 201 during the first semester of graduate study unless by a waiver examination they can demonstrate equivalent knowledge of the subject matter of the course.

Doctor of Philosophy in the field of Political Science.—Entering students must have a knowledge of statistics equivalent to the satisfactory completion of an introductory course in Statistics. An otherwise qualified student should satisfy this requirement as early as possible.

Required: the general requirements, pages 92–96, 99–101, including (1) a reading knowledge of two modern foreign languages, or a reading, writing, and speaking proficiency in one modern foreign language, or a reading knowledge of one modern foreign language and a specified level of knowledge in statistics, and (2) the satisfactory completion of examinations in a major and a minor field of study, which constitute the General Examination.

Each student must include in his program of study P Sc 201, 202, and 207 unless by a waiver examination he can demonstrate equivalent knowledge of the subject matter of the courses.

Major and Minor Fields of Study: Each student has a major and a minor field of study chosen from four principal *subject-matter* divisions of the discipline—Theory and Methodology, International Relations, Comparative and Foreign Politics, and American Politics.

Sub-fields of Study: Each subject-matter division includes several sub-fields of study (see below) from which the student constructs his program in consultation with his adviser. A major field of study consists of *three* sub-fields; a minor field consists of *two* sub-fields.

Fields of Study: Theory and Methodology (Analysis of Western Political Thought, Analysis of Marxist and Marxist-Leninist Thought, Scope and Methods of Political Science, Quantitative Political Analysis); Comparative and Foreign Politics (Comparative Political Analysis, Regional Comparative Politics, Domestic Politics of a Specified Major Political System); International Relations (International Politics, International Law, Regional International Relations, Foreign Relations of a Specified Major Political System); American Politics (American Political Process, National Policy-making Process, American Constitutional Law and Judicial Process, and State, Local, and Urban Politics).

Doctor of Philosophy fields of study in International Relations combine work in Economics, History, and Political Science.

Departmental prerequisite: P Sc 4 and 6 or 5 and 6 are prerequisite to all second-group courses in Political Science and Service-Learning Political Science.

POLITICAL SCIENCE

Staff

FIRST GROUP

4 Introduction to Political Science (3)

Introduction to the study of comparative political systems; emphasis on contemporary concepts and techniques used to examine politics and government. Students who receive credit for P Sc 4 cannot receive credit for P Sc 5. (Fall and spring)

Staff

5 Introduction to Political Science (3)

Introduction to the study of comparative political systems; emphasis on structures and processes of major foreign governments and the forces of basic ideologies. Students who receive credit for P Sc 5 cannot receive credit for P Sc 4. (Fall)

6 **Introduction to Political Science** (3) Staff
Introduction to the study of the structure, powers, and processes of the American political system. (Fall and spring)

ECOND GROUP

101 **Far East in the Modern World** (3) Michael
General character of Far Eastern societies and their response to the impact of America, Europe, and Russia; American policy in the Far East and the influence of world communism. (Fall)

103 **State Politics** (3) Burks
Theory and practice of American federalism, factors influencing state policy choices, state responsiveness to urban problems. (Fall)

104 **Urban Politics** (3) Burks
Demographic trends and implications, local metropolitan political systems, issues in urban politics, strategies of political change. (Spring)

105 **Scope and Methods of Political Science** (3) Wayne, Kim, Darcy
Nature of political inquiry, approaches to the study of politics and government, empirical methods of research. Prerequisite: Stat 51 or 53; or equivalent. (Fall and spring)

106 **The Politics of Social Change** (3)
Theories of revolution and change; protest in American politics; urban violence and political change; institutional innovation, reform, and responsiveness; realistic and unrealistic strategies of change. (Fall)

107 **Issues in Modern Political Thought** (3) Linden
Issues of modern political thought as seen through major representative thinkers. Emphasis on conservative, liberal, and radical thought.

108 **Science, Technology, and Politics** (3) Logsdon
Examination of the multiple impacts of scientific and technological developments on the political system. Discussion of public policies for the support, use, and control of science and technology. (Spring)

111 **Comparative Government and Politics** (3) Kim, Elliott, Gyorgy
Government and politics of the principal constitutional democracies of Western Europe. (Fall and spring)

*112 **Comparative Government and Politics** (3) Elliott, Gyorgy, Hinton
Government and politics of the communist nations; emphasis on the Soviet Union and the countries of Eastern Europe. (Fall and spring)

*115 **Government and Politics in Eastern Europe** (3) Gyorgy
Study of the contemporary social and ethnic structures, governmental systems, and international position of the Eastern European states within the Soviet system.

* P Sc 112, 115, and former 161 are related in their subject matter, and credit for only one of them may be applied toward a degree.

117–18 **Political Theory: Major Issues of Western Political Thought** (3–3) Linden

P Sc 117: foundations of Western political thought—Plato to Aquinas. P Sc 118: philosophical roots of modern political order and disorder—Machiavelli to Rousseau. (Academic year)

119–20 **American Political Thought** (3–3) Staff

Introduction to political thought in the United States from colonial times to the present. (Academic year)

121–22 **U.S. Constitutional Law and Politics** (3–3) Morgan

P Sc 121: separation of powers, federal-state relationships, economic regulation. P Sc 122: political and civil rights. Prerequisite: junior status. (Academic year)

125 **Legislative Process** (3) Darcy, Starrels

Study of Congress and the state legislatures, including legislative power structure, selection of legislators and the roles they play, decision-making, and the relationship between the legislative and executive branches. (Spring)

126 **The American Presidency** (3) Wayne

Development of the institution, selection process, role of the Presidency in policy-making. (Fall) Staff

141 **Development of Legal Institutions** (3)

Introduction to historical jurisprudence: primary attention to the origins of Roman Law of Continental Europe and of Anglo-Saxon Common Law. (Spring) LeBlanc, Darcy

145 **U.S. Political Parties and Politics** (3)

Party system and structure, role of ideology, voting behavior, campaigns and elections, devices for organizing the government. (Fall and spring) Darcy

146 **Public Opinion and Political Socialization** (3)

Sources of mass political attitudes and behavior, effects of mass attitudes and behavior on public policy. (Spring) Robinson

149 **Readings on the U.S. Congress** (3)

Readings and group discussions of major writings on the structure and processes of the U.S. Congress. Open only to students who are enrolled in P Sc 150 or who have congressional work experience. Selection is by a Departmental committee. (Fall and spring) Robinson

150 **Internship in Politics** (3)

Study of the political process in action through assignment to a political or governmental office. Limited to selected juniors and seniors, with preference given to seniors majoring in Political Science. Seminar open to congressional workers. (Fall and spring) Logsdon

151 **Public Administration and Public Policy-making** (3)

Examination of the process by which the federal government selects and implements public policies. Particular attention to the role of bureaucracies in the policy-making process. Criteria for the evaluation of public policy. (Fall)

160 **Modern Communist Ideologies** (3) Elliott

Intensive study of modern communism; emphasis on its antecedents and possible evolution. Careers and ideas of leading figures: Marx, Lenin, Stalin, Khrushchev, and Mao. (Spring)

*162 **Government and Politics of China** (3) Staff

Analysis of the government and politics of China, including the Chinese tradition, modern Chinese history, Marxism-Leninism, and Soviet influence.

163 **Soviet Foreign Policy** (3) Elliott

Relations with United States, Third World, China; international communism; instruments of foreign policy; interrelationships of domestic and foreign policies; ideology and foreign policy.

167 **U.S. Foreign Policy** (3 or 6) Purcell

Constitutional and political factors that determine the formulation, execution, and substance of U.S. foreign policy. (Fall)

171 **International Politics** (3) Starrels, Storrs

International actors, international and domestic environments of foreign policy, global and regional patterns, general characteristics of foreign policy. (Fall and spring)

172 **International Organizations** (3) Staff

Development and operations of the United Nations, regional organizations, and functional international organizations. (Fall and spring)

177 **Governments and Politics in Latin America** (3) Storrs

Political processes and institutions in Latin America; emphasis on Argentina, Brazil, Chile, and Mexico. (Fall)

178 **Latin America: Political Patterns and International Relations** (3) Storrs

U.S.-Latin American relations, inter-American diplomacy and organization, foreign policies of selected states, the Cuban revolution. (Spring)

179 **International Relations of the Middle East** (3) Reich

Analysis of the regional and international relations of the Middle East. (Spring 1974 and alternate springs)

181–82 **Public International Law and Organization** (3–3) Staff

Survey of the public law of nations. P Sc 181: emphasis on the law of peace. P Sc 182: continuation of the law of peace; attention to neutrality and the so-called law of war. (Academic year)

183–84 **Senior Seminar: Urban Affairs** (3–3)

Readings and group discussions of major writings on urban political and policy-making processes. Primarily for senior Urban Affairs majors; others admitted by permission of instructor. (Academic year)

* P Sc 162 and 194 are related in their subject matter, and credit for only one may be applied toward a degree.

185–86 **Apprenticeship in Urban Affairs** (3–3)
Study of urban political and policy-making processes through assignment to an urban-related political or governmental office. Primarily for senior Urban Affairs majors; others admitted by permission of instructor. (Academic year) Nimer

189 **African International Politics** (3)
Analysis of interstate relations in Africa and of selected aspects of African relations with the outside world. Recommended but not required: P Sc 190 or equivalent. (Spring) Nimer

190 **Politics of Middle and Southern Africa** (3)
Comparative analysis of the political systems of selected countries of non-Mediterranean Africa. (Fall) Reich

191 **Governments and Politics of the Middle East** (3)
Domestic and international politics of the eastern Arab states, Turkey, Iran, Israel. (Fall) Reich

192 **Governments and Politics of North Africa** (3)
Domestic and international politics of Algeria, Tunisia, Morocco, Libya, Egypt, Sudan; their relations with states of the Middle East. (Spring) Hinton

193 **Governments and Politics of South and Southeast Asia** (3)
Domestic and international politics of the major states in the area. (Spring) Michael

*194 **Governments of China and Japan** (3)
Institutions and processes of government in contemporary China and Japan, with some historical background. Attention to ideological forces. (Spring) Purcell, Reich, Storry

197 **Proseminar: International Affairs** (3 or 6)
Substantive problems of U.S. foreign policy. Readings, term papers, discussion. Staff

199 **American Government and Politics** (3)
Reading and research on selected contemporary problems. Limited to juniors and seniors majoring in Political Science or Public Affairs. Admission by permission of instructor.

THIRD GROUP

Third-group Political Science courses are designed for graduate students who have appropriate second-group prerequisites. Wayne

201 **Scope and Methods of Political Science** (3)
Introduction to the discipline and the profession, analysis of the nature of political inquiry, discussion of conceptual approaches to the study of politics and government. (Fall) Linden

202 **Modes of Political Inquiry** (3)
Examination and comparison of some major modes of political thought

* P Sc 162 and 194 are related in their subject matter, and credit for only one may be applied toward a degree.

Analysis of discursive, systematic, philosophical, and scientific approaches. (Spring)

203 **State Politics** (3) Burks

Readings and discussions on developments in state politics research, changing roles in the federal structure, state political systems, governmental performance, policy innovation and change. (Fall)

204 **Urban Politics** (3) Burks

Readings and discussions on patterns and implications of urban growth, local and metropolitan political systems, policy formation and change, conflict management, political constraints on social reform. (Spring)

205 **Government, Science, and Technology** (3) Logsdon

Examination of the demands on national and international political systems resulting from the impact of scientific and technological developments and of the responses of governmental institutions and processes to these demands. (Fall)

206 **Science, Technology, and Public Affairs** (3) Logsdon

In-depth examination of selected domestic policy issues with significant scientific or technological aspects. Teams of students will prepare policy analyses on each issue discussed. (Spring)

207 **Empirical Political Analysis** (3) Darcy

Techniques of data gathering and analysis, the uses of data in political research. (Spring)

208 **Seminar: Science, Technology, and World Order** (3)

Reading and research on selected international policy issues of scientific or technological importance. (Spring)

211–12 **Comparative Government and Politics** (3–3) Kim, Starrels

Problems of comparative political analysis; a comprehensive examination of the literature in comparative politics. (Academic year)

213–14 **Comparative Communist Systems** (3–3) Linden

Comparative study of the communist world and communist movements; examination of sources of unity and diversity as well as such issues as leadership, ideology, revisionism, nationalism, and reform. (Academic year)

215–16 **Seminar: the Communist Camp in World Politics** (3–3) Staff

Significant issues of communism, particularly in the Soviet Union and Red China; concept and structure of "world socialist system"; intra-Bloc relations with emphasis on the Sino-Soviet dispute.

217 **Readings in Political Theory** (3) Linden

Readings and discussions, principally on modern political and constitutional theory since the 17th and 18th centuries; emphasis on basic issues and schools of thought. (Fall)

219 **Seminar: Western European Politics** (3) Starrels

Comparative examination of major political system characteristics of France, England, and the two Germany's. Special attention devoted to political culture, socialization, recruitment, and communication.

221 **The United States Constitution and the Judicial Function** (3) Morgan
Lectures and group discussions on constitutional law and politics. (Fall)

224 **Readings in Socialism and Communism** (3) Elliott, Linden
Readings and discussions of works illuminating the evolution of pre- and post-Marxian socialism. (Fall)

227 **Seminar: Governments and Politics of Eastern Europe** (3) Gyorgy
Comparative study of Eastern European states: political, social, economic institutions; problems of regional integration and relations with outside powers. (Spring)

229 **Readings in Soviet Government and Politics** (3) Elliott, Linden
Readings in contemporary Soviet domestic government and politics. Prerequisite: 3 semester hours selected from Hist 146, P Sc 194; or equivalent. (Fall)

*231 **Seminar: Sino-Soviet Relations** (3) Michael
Background, development, and status of conflict within the communist movement; emphasis on the role of Chinese communists. Prerequisite: 3 semester hours selected from Hist 187; P Sc 101, 194; or equivalent. (Spring)

232 **Seminar: International Communications** (3) Staff
East-West perspectives. Theory and history of national patterns of international communications focusing on basic political and psychological aspects of communication between major communist and noncommunist powers. (Spring)

233 **Seminar: Soviet Government and Politics** (3) Elliott, Linden
Research seminar in selected problems of Soviet domestic government and politics. Emphasis: since Stalin. Prerequisite: P Sc 229 or permission of instructor. (Spring)

236 **Research Seminar: Urban and Regional Problems** (3) Staff
Population and density, race and class, participation and politics, restructuring of government, housing needs, transportation, the culture of the city. (Spring)

†237 **Chinese Law** (3) (Same as Law 547 (2)) LeBlanc

†238 **Soviet Law** (3) (Same as Law 546 (2))

245 **The American Political Process** (3)
Lecture and discussion on the nature and functions of political parties, interest organizations, and other political groupings in the American political system. (Fall) Wayne

246 **American Policy-making Process** (3)
Lecture and discussion on the structure and processes for formulating

* An interdepartmental course offered by the departments of Political Science and History.
† Students registering for P Sc 237 or 238 make special arrangements with the instructor for supplementary assignments equivalent to one additional semester hour. For description of the course, see the *National Law Center* catalogue.

public policy at the national level. Emphasis on interaction between executive and legislative branches. (Spring)

253 **Seminar: Chinese Government and Politics** (3) Michael
Political institutions and concepts in late imperial times, during the revolution, under national government, and under communism. Emphasis on the communist period. (Fall)

254 **Colloquium: East Asia** (3) Michael
Interuniversity research colloquium of faculty members concerned with the study of China, Japan, and Korea. Advanced graduate students admitted with permission of faculty group. (Fall and spring)

255 **Colloquium: Russia and Eastern Europe** (3) Gyorgy
Interuniversity research colloquium of faculty members concerned with the study of Russia and Eastern Europe. Advanced graduate students admitted with permission of faculty group. (Fall and spring)

257–58 **Seminar: Communism in Developing Countries** (3–3) Staff
(*P Sc 258 was formerly entitled Seminar: Communist Parties in the Noncommunist World*)
Examination of international communist policy for, and communist parties in the noncommunist world. (Academic year)

265–66 **Chinese Communist Policy Processes** (3–3) Hinton
Introduction to the literature and to graduate research in contemporary Chinese politics. P Sc 265: readings and group discussion. P Sc 266: research seminar. (Academic year)

267 **Seminar: U.S. Foreign Policy** (3) Purcell
Research and selected reading as the basis for an analysis of the foreign policy of the United States, with particular reference to the decision-making process and the execution of policy. (Fall)

268 **Seminar: Comparative Foreign Policies** (3)
Research and selected reading as the basis for an analysis of the foreign policies of major powers, with particular reference to the decision-making process and the execution of policy. (Spring)

269 **Seminar: Soviet Foreign Policy** (3) Elliott
External policies and relations of the USSR; relations with other communist states, Western powers, and other countries. (Spring)

270 **Political and Social Institutions of Eastern Europe** (3) Gyorgy
Major political and social factors which have shaped the inter-war, World War II, and post-war evolution of Eastern Europe; emphasis on selected countries. (Fall)

271–72 **Problems in International Organizations** (3–3) Reich
P Sc 271: analysis of the political dimension of international organizations; special reference to the United Nations. P Sc 272: examination of the operational and administrative aspects of international organizations; special reference to regional and functional bodies. (Academic year)

273 Public Opinion and Foreign Policy (3) Staff
Development, organization, and operation of international information programs by major world powers. U.S. public opinion influencing foreign policy formation and conduct. (Spring)

274 Principles and Problems of International Political Communication (3) Staff
Reading and discussion of public opinion/foreign policy relationships and operation of international political communication programs by major world powers as a tool of foreign policy. (Fall)

275 Theories of International Politics (3) Nimet
Critical examination of contemporary theories, both empirical and normative. (Fall)

276 Topics in International Politics (3) Nimet
Reading, research, and discussion of selected structural and procedural aspects of international political relations. (Spring)

277–78 Seminar: Latin American Politics (3–3) Storrs
P Sc 277: readings and discussions on Latin American political processes and institutions. P Sc 278: individual research and class discussion on selected topics of Latin American politics. (Academic year)

279 Seminar: International Relations of the Middle East (3) Reich
Reading and research on the regional and international relations of the states of the Middle East. (Spring 1974 and alternate springs)

281–82 Seminar: Public International Law (3–3) Brewer
Research in the public law of nations, with special attention to problems of pacific settlement, sanctions, war, neutrality, and state jurisdiction, and to their political implications. (Academic year)

287 Seminar: Problems in Latin American Civilization (3) Gordon
Interdisciplinary seminar partially guided by a specialist in the methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. Admission by permision of instructor. (Spring)

288 Seminar: Soviet Military Policy and Strategy (3) Wolfe
Soviet developments in military policy and strategy with attention to intra-Bloc military cooperation, political context of Soviet military policy, significant changes in recent Soviet military thought. (Fall or spring)

290 Topics in African Politics (3) Nimet
Reading, research, and discussion of selected aspects of African domestic and international politics. (Spring)

291 Governments and Politics of the Middle East (3) Reich
Reading and research in selected problems in the governments and politics and international relations of the Middle East. (Fall)

292 Governments and Politics of North Africa (3) Reich
Reading and research in selected problems in the governments and politics and international relations of North Africa. (Spring)

293 **Seminar: Governments and Politics of South and Southeast Asia** (3) Purcell

Research and selected reading as basis for analysis of structure, problems, and policies of the governments of selected countries in the area, with particular reference to India. (Spring)

294 **Seminar: Governments and Politics of Japan and Korea** (3) Halpern

Readings, research, and discussion on the contemporary political problems and relevant historical background of Japan, North and South Korea. (Fall or spring)

295 **Seminar: Chinese Communist Foreign Policy** (3) Hinton

Objectives; formulation and implementation; Communist China as Asian state, revolutionary influence, would-be great power. Prerequisite: 3 semester hours selected from P Sc 101, 194; or equivalent. (Spring)

296 **The Communist Role in Far Eastern International Politics** (3) Hinton

Evolution of communist Asian strategy, development of Asian communist states and parties, role in international politics and crises, Sino-Soviet rivalry. (Fall)

297 **Independent Study** (arr.) Staff

Limited to Master's degree candidates. Permission of instructor, in writing, required. (Fall and spring)

298 **Southeast Asia in World Politics** (3) Staff

Southeast Asia in great-power perspective. Balance-of-power concept and development of Asian subsystem. (Spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

OURTH GROUP

ourth-group Political Science courses are designed for graduate students who have ppropriate third-group prerequisites. Offered as the demand requires.

307 **Political Parties** (3) LeBlanc

Advanced readings and group discussions.

308 **Public Opinion and Political Socialization** (3) Darcy

Advanced readings and group discussions.

309 **The American Presidency** (3) Wayne

Advanced readings and group discussions.

310 **American Legislatures** (3) Staff

Advanced readings and group discussions.

311 **Comparative Government and Politics** (3) Kim, Starrels

Advanced readings and group discussions.

312 **Seminar: Comparative Government and Politics** (3) Kim, Starrels

Advanced research.

318 **Normative Political Theory** (3) Staff
Advanced readings and group discussions.

325 **Research Seminar: Topics in Marxism-Leninism** (3) Elliott, Linden
Advanced research.

345 **American Politics** (3) LeBlanc, Darcy
Advanced research.

346 **American Government** (3) Wayne, Morgan
Advanced research.

375 **International Politics** (3) Nimer, Storrs, Reich
Advanced readings and group discussions.

376 **Seminar: International Politics** (3) Nimer, Storrs, Reich
Advanced research.

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

SERVICE-LEARNING POLITICAL SCIENCE

SECOND GROUP

153 **Urban Policy-making** (6) Keith
Study of urban policy-making process through readings, group discussions, research, and work in an urban-related political or governmental office. Prerequisite: P Sc 103 or 104. (Fall and spring)

154 **Law and Social Change** (6) Keith
Study of the legal system and its role in promoting social change. Readings, group discussions, and work with lawyers and 3rd-year law students. (Fall and spring)

155 **American Political Behavior** (6) Keith
Study of American political behavior through readings, group discussions, research, and work in a political or governmental office. (Fall and spring)

Portuguese

See "Romance Language and Literatures."

ofessors Thelma Hunt (*Emeritus*), E.L. Phillips, J.N. Mosél, B.I. Levy, W.E. Caldwell, R.D. Walk (*Chairman*), R.K. White (*Emeritus*), Gardner Murphy (*Visiting*), Jacqueline Goodnow (*Research*), M.L. Meltzer, A.D. Kirsch
ofessorial Lecturers B.M. MacLennan, R.K. Kahn, W.A. McClelland, Nathene Loveland
sociate Professors C.E. Tuthill, Eva Johnson, Virginia Kirkbride, R.H. Tanck (*Research*), D.E. Silber, Charles Rice, Eugene Abravanel, S.A. Karp
djunct Associate Professor C.J. Lange
sociate Professorial Lecturer S.L. Cohen
sistant Professors R.W. Holmstrom, J.A. Bull III, L.A. Rothblat
djunct Assistant Professor Elyse Lehman
sistant Professorial Lecturer Sally Sibley

INICAL TRAINING STAFF

sociate Clinical Professors I.M. Zimmerman, Bruce Becker, J.W. Cummings, Mimi Spielberg, Meira Zedek, Elliot Blum, Phyllis Daen, Rochelle Kainer
sistant Clinical Professor Alice Adams

Bachelor of Arts with a major in Psychology (*Departmental*).—The following quirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should con- lt the departmental adviser regarding courses to be taken in satisfying the require- ents for "meaningful initiation" into the Humanities and the Natural and Mathe- atical Sciences.

2. Prerequisite courses—6 semester hours selected from Psyc 1, 5, and 6.

3. Required courses in related areas:

(a) 3 semester hours selected from Stat 51, 53, 104, or any first-group course Mathematics except Math 6. (Students expecting to do graduate study in sychology should elect Stat 53 or 104.)

(b) 6 semester hours selected from *one* of the following departments: Anthro- logy, Economics, History, Political Science, or Sociology.

(c) 6 semester hours selected from American Civilization, Anthropology, conomics, Geography and Regional Science, History, Philosophy (Phil 71, 113, 151 recommended), Political Science, Religion, or Sociology.

(d) Two courses (6 to 8 semester hours) selected from *one* of the following epartments: Biological Sciences, Chemistry, Geology, Mathematics, Physics, or latistics (Biology is recommended for those expecting to do graduate study in sychology). This requirement is in *addition* to the Mathematics/Statistics require- ent listed in 3(a), above.

4. Required courses in the major—24 semester hours in second-group Psychology ourses, including Psyc 196 and one course from each of the following groups— roup *A:* Psyc 118, 121, 161; *Group B:* Psyc 115, 144, 151, 156; *Group C:* Psyc 101, 12, 129, 131.

Although there is no foreign language requirement, students contemplating gradu- te study are reminded that most graduate schools require knowledge of one and sometimes two foreign languages.

Master of Arts in the field of Psychology.—Prerequisite: the degree of Bachelor f Arts with a major in Psychology at this University, or an equivalent degree. Ad- mission to the program is limited; preference will be given those who plan to con- nue toward a Doctor of Philosophy degree.

Required: the general requirements, pages 92–99. Of the 24 required semester hours (exclusive of the thesis), a minimum of 18 must be in third-group Psychology courses including Psyc 202 and either 203 or 204; 6 may be in related fields approved by the Department. For detailed requirements consult the Chairman of the Department.

Doctor of Philosophy in the field of Psychology.—Prerequisite: the degree of Bachelor of Arts with a major in Psychology. Students admitted from other disciplines will be expected to complete prerequisite undergraduate courses to prepare for graduate study in Psychology. Qualifying scores on the Miller Analogies Test and the Aptitude Test of the Graduate Record Examination are required for admission.

Required: the general requirements, pages 92–96, 99–101, including (1) the satisfactory completion of the tool requirement (see pages 99–100); (2) Psyc 202, 203–4, Stat 105; and (3) the satisfactory completion of two Comprehensive Examinations (one in general psychology, one in the major field of specialization).

Areas of study: Clinical, Developmental, Experimental, Industrial and Organizational, and Social Psychology.

Students electing Psychology courses in the freshman year should begin with Psyc 1; with permission of instructor students may elect Psyc 5–6 in the freshman year.

Departmental prerequisite: Psyc 1 or 5 or 6 is prerequisite to all other courses in Psychology. Six semester hours in Psychology courses are prerequisite to all second-group courses in Psychology. The departmental prerequisite may be waived with the permission of the instructor.

FIRST GROUP

1 **General Psychology** (3)
Fundamental principles underlying human behavior. (Fall and spring)

5–6 **Principles and Methods of Psychology** (3–3)
Lecture (2 hours), laboratory (2 hours). An experimental approach to understanding behavior; individual and class experiments performed. Psyc 5: sensation, perception, and emotions and their relation to adaptive behavior. Psyc 6: topics of motivation, learning, memory, and problem-solving. Laboratory fee, $6 a semester. (Academic year)

8 **Psychology of Motivation and Personality** (3) Tuthill, Silber, Rice, Holmstrom
Introduction to the psychology of personality. Principles of motivation, personality development, social and cultural factors, and assessment and description of personality emphasized. (Fall and spring)

22 **Introduction to Educational Psychology** (3) Kirkbride, Tanck, McClellan
The contributions of psychology to education; emphasis on learning. (Fall and spring)

29 **Psychology of Childhood** (3)
Developmental approach to study of the child. Emphasis on the socialization process, learning, and the child's view of the world. (Fall or spring)

ECOND GROUP

101 **Abnormal Psychology** (3) Meltzer, Silber, Holmstrom
Causes, diagnosis, treatment, and prevention of various types of maladjustments and mental disorders. Prerequisite: 6 semester hours in psychology, or 3 in psychology and 6 in a biological science. (Fall and spring)

104 **Ecology and Mental Health** (3) Karp
Examination of the linkages between aspects of the physical environment and mental health. Opportunity for field research in this area.

105 **The Psychology of Consumer Behavior and Attitudes** (3) Phillips
Consumer behavior and attitudes in regard to advertising, buying habits, consumer action groups and social pressures, and mass persuasion. Lectures and field work. (Spring)

110 **Cognitive and Perceptual Development** (3) Abravanel
Concepts and research in the area of developmental psychology; emphasis on the growth and development of perception, cognition, and language. (Spring)

112 **Psychology of Adolescence** (3) Johnson
Psychological characteristics and problems peculiar to adolescence, with emphasis on application of psychology to solution of such problems. (Fall)

115 **Psychology of Language and Communication** (3) Mosél
Introduction to psycholinguistics and verbal behavior. Information theory, generative grammar theory, cultural and linguistic structures in the perception and learning of language. (Spring)

118 **Neuropsychology** (3) Rothblat
Analysis of neural processes underlying behavior. Basic structure and functions of the nervous system, with emphasis on sensory processes, learning and memory, motivation, and emotion. (Fall and spring)

121 **Psychology of Learning** (3) Bull
Theories and issues related to basic learning processes as determinants of behavior. Emphasis on current research using both human and animal subjects. (Fall)

129 **Theories of Personality** (3) Kirkbride, Karp
Survey of personality theories; emphasis on their application to problems of individuals. (Fall and spring)

131 **Psychological Tests** (3) Hunt, Karp
Survey of psychological tests and their more common uses in business, industry, government, law, medicine, and education. Material fee, $7. (Fall and spring)

144 **Personnel and Industrial Psychology** (3) Mosél
Psychological concepts and methods applied to problems of personnel management, human engineering, employee motivation, and productivity. (Spring)

151 **Social Psychology** (3) Tuthill, White
Social foundations of attitudes and behavior: cognition, motivation, role-behavior, communication, small-group processes, racial attitudes, nationalism, and war. (Fall and spring)

156 **Psychology of Attitudes and Public Opinion** (3) Tuthill
Psychology of opinion formation, measurement of opinion, social determinants of attitudes, psychological processes in propaganda, bases of receptivity to propaganda, psychological warfare. (Spring)

161 **Comparative Psychology** (3) Caldwell
Lectures and demonstrations on animal psychology. Psychological processes in infrahuman organisms, evolution of behavior, the place of animal experimentation and research in psychology. (Spring)

170 **Clinical Psychology** (3) Levy
An exploration of the history, functions, and problems of the clinical psychologist. Assessment, treatment, community approaches, ethics. Prerequisite: Psyc 101, 131. (Spring)

191 **Independent Research in Psychology** (3) Staff
Opportunity for work on individual library or experimental projects. Open to qualified students by permission; arrangements must be made with the sponsoring faculty member prior to registration. May be repeated once for credit. (Fall and spring)

192 **Field Experience in Psychology** (3) Abravanel, Levy
Selected senior psychology majors will spend a minimum of 6 hours a week in a local hospital, school, or community setting. Students registering for this course must have the approval of the instructor by May 15 for the fall semester and by December 15 for the spring semester. (Fall and spring)

196 **History and Systems of Psychology** (3) Caldwell, Rice
Senior capstone course which includes a survey and integration of the major viewpoints and concepts of psychology. Required of Psychology majors. (Fall and spring)

198 **Current Research Issues in Psychology** (3) Staff
Conducted as a seminar. Recent experiments in psychology, including those performed by members of the class; emphasis on student participation. May be repeated for credit. (Spring)

THIRD GROUP

Third-group courses are limited to graduate students in Psychology, except by special permission of instructor. Abravanel, Bu

202 **Psychological Research Methods and Procedures** (3)
Required in all graduate Psychology programs. Prerequisite: graduate standing, a laboratory course in psychology, and an elementary course in statistics. (Spring)

203–4 **Experimental Foundations of Psychology** (3–3) Bull, Rothblat

Required of doctoral students in Psychology during first year of study. Psyc 203: basic issues in learning and motivation. Psyc 204: physiological processes; sensation and perception. (Academic year)

205 **Research Methods in Intervention Programs** (3) Karp

Special problems of conducting research in a clinical setting; emphasis on content and method of studies designed to assess effects of therapeutic intervention. Prerequisite: Psyc 202. (Fall)

206 **Methods of Clinical and Personality Research** (3) Rice

Review of techniques especially relevant to research in clinical, personality, and social psychology. Scaling methods, multivariate techniques, introduction to the use of computers in data analysis. Prerequisite: Psyc 202; Stat 105 or equivalent. (Spring)

207–8 **Psychological Assessment** (3–3) Holmstrom, Levy, Meltzer, Silber

Open only to clinical graduate students in the Department of Psychology. Theoretical and clinical aspects of assessment; includes interviewing, psychometric tests, and projective techniques. Two-hour laboratory—diagnostic work at clinical facilities. Material fee, $7 a semester. (Academic year)

209 **Seminar: Psychology of Motivation** (3) Caldwell

Various theoretical approaches to the psychology of motivation; systematic concepts and experimental findings deriving from each approach. (Spring)

211 **Assessment of Cognitive Functioning** (3) Levy

Concepts of intelligence and achievement and their assessment through a variety of group and individual procedures. Emphasis on evaluation of children. Material fee, $7. Admission by permission of instructor.

212 **Personality Assessment by Projective Techniques** (3) Levy

Methods of personality assessment, including psychometric and projective tests. Material fee, $7. Admission by permission of instructor.

213–14 **Seminar: Developmental Psychology** (3–3) Abravanel, Walk

Psyc 213: research and theory in developmental psychology, emphasis on perceptual and cognitive development; consideration of the development of social awareness and of genetic-biological growth proceses. Psyc 214: current research and theory in perceptual and cognitive development, intensive study of selected research problems. (Academic year)

215 **Personality Assessment by Multiple Procedures** (3) Meltzer

Consideration and use of a wide range of procedures in assessment of personality and psychopathology of children. Prerequisite: Psyc 207–8 or 211 and 212. Graduate students in fields other than Psychology admitted by permission of instructor. Material fee, $7.

216 **Psychological Assessment by Graphic Means** (3) Levy

Examination of graphic procedures for assessment of intelligence and personality; clinical use and evidence of validity. Common interpretive principles sought. Human figure drawings and free paintings as examples. Admission by permission of instructor. (Fall)

Silber

218 **Seminar: Systems of Psychotherapy** (3)
Introduction to theory and technique of psychotherapeutic approaches: psychoanalytic, ego-centered, nondirective, transactional, and others. Original sources surveyed. Limited to graduate students in clinical psychology except when offered in Summer Sessions. (Spring)

Meltzer

220 **Seminar: Abnormal Psychology** (3)
Study of selected problems. (Fall)

MacLennan

221–22 **Seminar: Group Psychotherapy** (3–3)
For graduate students in the Department of Psychology; open to others with permission of instructor, only when space permits. Psyc 221: didactic material and laboratory experience with emphasis on group dynamics and processes; survey of group therapy approaches. Psyc 222: supervised experience with therapeutic groups. Prerequisite to Psyc 222: Psyc 221. (Academic year)

Bull

223 **Seminar: Learning** (3)
Selected topics of current research interest in the psychology of learning. (Spring)

Johnson

226 **Seminar: Clinical Psychology of Childhood and Adolescence** (3)
Survey of behavior and personality disorders. (Spring)

Kahn

227–28 **Seminar: Principles of Psychotherapy** (3–3)
For graduate students in clinical psychology; open to others, with permission of instructor, only if space permits. Patient's needs and demands on the therapist. Case participation heavily relied upon. Prerequisite: Psyc 218. (Academic year)

Phillips

229 **Seminar: Principles of Behavior Change** (3)
Stimulus-organism-response variables and their interactions, with emphasis on learning theory as applied to clinical problems. (Fall)

Sibley

230 **Seminar: Operant Applications to Clinical Problems** (3)
Examination of the broad role of reinforcement contingencies, behavior shaping, and other experimentally derived concepts as they apply to the management and control of a wide variety of human clinical problems. Prerequisite: Psyc 229. (Spring)

Mosd

231 **Development of Psychometric Instruments** (3)
Quantitative techniques and principles used in construction, standardization, and evaluation of personality and ability measures for research and practice; quantification of human judgment for measurement purposes. Prerequisite: course in tests and measurements and an elementary course in statistics. (Fall)

Mosd

234 **Seminar: Theory of Psychological Measurement** (3)
Development of classical axiomatic-deductive theory underlying major applications in the construction and evaluation of psychological tests. (Spring)

Meltzer, Lev

235–36 **Seminar: Community Mental Health** (3–3)
For graduate students in the Department of Psychology; open to others with permission of instructor, only if space permits. Survey of issues and

techniques in community mental health; emphasis on educational systems and community mental health issues in the schools. Involves project in school setting. Prerequisite to Psyc 236: Psyc 235. (Academic year)

245 **Seminar: Organizational Behavior** (3) Mosél

Analysis of organizational behavior; emphasis on motivation and productivity. Recent research on employee attitudes, primary group, supervisory leadership, formal and informal organization, job design. (Spring)

246 **Seminar: Personnel Measurement Techniques** (3) Mosél

Detailed consideration of techniques of personnel selection and performance evaluation. Employment tests, personal data, assessment interviews, and performance ratings.

251 **Seminar: Advanced Social Psychology** (3) Tuthill, White

Current research and theory: motivation and cognition, dissonance, social interaction theory, authoritarianism, class differences, group dynamics, group conflict. (Fall)

252 **Research Methods in Social Psychology** (3) Tuthill, White

Opinion and attitude survey techniques: interviewing, content analysis, report-writing, etc. (Spring)

254 **Seminar: Experimental Social Psychology** (3) Tuthill

Experimental study of small groups, group climates, interaction process analysis. Lewin's field-theoretical approach to individual and group processes. (Spring 1974 and alternate springs)

256 **Seminar: Psychological Causes of War** (3) White

An attempt to integrate evidence from animal behavior, child behavior, anthropology, psychiatry, and recent history, including World Wars I and II and the present East-West conflict. (Spring)

259 **Seminar: Social Psychology of Communism** (3) White

Public and governmental opinion in communist countries, authoritarian thinking, communist propaganda, problems of Western communication with communist countries. (Fall)

261 **Seminar: International Communication** (3) Mosél

Primarily for students in the schools of Government and Business Administration and Public and International Affairs. Communicating information and effecting attitude change across cultures by mass media. Psychocultural factors and the functions of mass communication in the development of transitional societies. (Spring)

272 **Seminar: Theories of Personality** (3) Caldwell

Emphasis on theoretical problems and methodology in the field of personality study. (Fall)

283–84 **Practicum in Clinical Psychology** (3–3) Silber

Supervised practical instruction in agencies doing clinical psychological work; requires 64 full-time days during the year. Prerequisite: Psyc 212. Admission by permission of instructor. (Academic year)

289 **Seminar: Current Topics in Experimental Psychology** (3) Staff
Review and discussion of contemporary research and theory in a specialized field of psychological study, by leaders in the field. Independent topics each semester; may be repeated for credit. (Fall and spring)

290 **Seminar: Special Problems in Personality Research** (3) Murphy
Selected theoretically important and challenging contemporary research problems. May be repeated once for credit. (Fall and spring)

292 **Seminar: Perception** (3) Walk
Study of current research and theory in the experimental psychology of perception. (Fall 1974 and alternate falls)

293 **Seminar: Psychology of Thinking** (3) Rice
Review of basic theoretical positions concerning the processes of cognition: memory, concept formation, and reasoning. (Spring 1974 and alternate springs)

295 **Independent Research in Psychology** (arr.) Staff
Individual library or experimental research under supervision of staff member. Arrangements must be made with sponsoring faculty member prior to registration. May be repeated once for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy major field examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Public Administration

Professors D.S. Brown (*Chairman*), Waldo Sommers (*Emeritus*), D.R. Cloutier, Ben Posner (*Visiting*)
Professorial Lecturers W.G. Torpey, C.E. Goode, C.L. Berg, Martin Kriesberg
Associate Professors S.R. Chitwood, M.M. Harmon
Associate Professorial Lecturers W.E. McConville, M.R. Burt
Assistant Professor Irwin Dubinsky
Assistant Professorial Lecturer T.D. Lynch

Programs of study in Public Administration leading to the degrees of *Master of Public Administration, Master of Arts in Government,* and *Doctor of Public Administration* are offered by the School of Government and Business Administration (see pages 131–61).

THIRD GROUP

213 **Administration in Government** (3) Cloutier

Critical analysis of federal administrative organizations as an integral part of the political system. Roles of Congress, the President, the courts, interest groups, political parties, and the public in the administrative process; special attention to centripetal and centrifugal forces. (Fall and spring)

214 **Policy Analysis in Public Administration** (3) Chitwood

Introduction to systematic analysis of public policy alternatives. Development of a conceptual framework for differentiating types of public policies, e.g., distributive, regulatory, redistributive; examination of the contribution of economic, quantitative, and research techniques to the development, administration, and evaluation of these policies. (Fall)

215 **Comparative Administrative Systems** (3) Wofsey

Examination and analysis of the administrative systems of selected foreign governments; attention to practices applicable to administration in the United States.

217 **Seminar: Developmental Administration I** (3) Kriesberg

National cultures and their relationships to administrative systems. Colonialism and its vestiges. The problems and deficiencies of administration in underdeveloped countries. (Fall)

218 **Seminar: Developmental Administration II** (3) Brown

Problem of the transfer of administrative capability from one country to another. Political and administrative development. Unilateral and multilateral approaches. The role of the innovator. Strategies of administrative development. (Spring)

220 **Law, Responsibility, and the Public Administrator** (3) Harmon

Exploration and analysis of the legal and moral forces and factors which guide the administrator/manager in his decision-making. The role of the law, the courts, and the agency counsel. Understanding the several meanings of responsibility, including accountability. (Fall and spring)

221 **Management in the Executive Branch** (3) Posner

Analysis of application of management theory and practice in the executive branch of the federal government; emphasis on staff responsibilities and relationships and internal organization and control. (Fall and spring)

223 **Behavioral Factors in Large Organizations** (3) Brown

Analysis of the nature and characteristics of bureaucracy; dysfunctionalism; approaches to policy guidance and leadership, particularly in large public organizations; influence and control systems. (Fall and spring)

231 **Public Personnel Administration** (3) Sommers

Survey of basic principles and functions of personnel administration in the public service. Roles of personnel management, recruitment, placement, wage and salary administration, training, retirement, and other personnel functions. (Fall)

232 **Problems in Public Personnel Management** (3) Sommers

Analysis and evaluation of major personnel management problems in government; employee-management relations; interagency and intergovernmental relationships. Impact of automation. Evaluation of personnel systems. (Spring)

233 **Seminar: Manpower Development and Utilization** (3) Staff

Examination of public and private manpower policies and programs, including their rationale and effectiveness. Students will select a specific program area for individual exploration. (Fall)

235 **Technological Change and Manpower** (3) Staff

Research, discussion, and readings dealing with manpower problems arising from automation and other technological changes. Evaluation of these developments in government and business; their implications for productivity, employment, training and education, and personnel and industrial relations. Analysis of economic, political, and social factors influencing public and private manpower policies. (Fall and spring)

*243 **Local Government Law** (3) (Same as Law 349 (2)) Cloutier

245 **Managing the Changing Federalism** (3) Dubinsky

An analysis of organic changes in the administration and management of intergovernmental programs in a rapidly changing American federalism. Federal, state, regional, and locally-shared systems studied from theoretical and practical vantages.

246 **Urban Dynamics and Citizen Participation in Administration** (3) Cloutier, Chitwood

Exploration of the nature, costs, and benefits of citizen participation in administration of metropolitan area programs. Focus on tools of citizen participation, their impact on federal policy and reorganization of urban government, and the effect of decentralization on citizen participation. (Fall)

248 **Financing Metropolitan Services** (3) Dubinsky

Analysis of the structure and administration of public finance of local governments. (Spring)

249 **Administration in Metropolitan Area Governments I** (3) Dubinsky

An ecological approach to understanding and managing urban processes and trends; exploration of economic, social, and political factors that affect metropolitan administration. (Fall)

250 **Administration in Metropolitan Area Governments II** (3) Dubinsky

Examination of metropolitan governmental structures and functions, public and private demands on the system, decision-making in the urban complex, feedback and evaluation. (Spring)

* Students registering for P Ad 243 make special arrangements with the instructor for supplementary assignments equivalent to one additional semester hour. For description of the course, see the *National Law Center* catalogue.

*251 **Governmental Budgeting** (3) Stromsem, Posner

Survey of the basic concepts, principles, and practices in governmental budgeting; interrelationship of planning, programming, and budgeting; their role in the management process. (Fall and spring)

*252 **Problems in Planning, Programming, and Budgeting** (3) Chitwood, Posner

Intensive analysis of developments in federal planning, programming, and budgeting; application of new tools in the decision-making process; evaluation of the system. (Fall and spring)

254 **Seminar: Financial Management in the Federal Service** (3) Stromsem

Functions and interrelationships of central federal financial management agencies, their policy, economic and managerial roles, controllership functions, and standards and practices in financial management. (Spring)

260 **Policy Formulation and Administration** (3) Harmon

Analysis in depth of factors and processes involved in policy development with particular attention to selected areas of national policy; development of agency goals and objectives. (Fall and spring)

262 **Seminar: Science, Technology, and Public Policy** (3) Black

The impact of science and technology upon public administration in terms of both administrative practice and national policies. (Spring)

†263 **Seminar: Regulation of Transportation I** (3) (Same as Law 407 (2))

†264 **Seminar: Regulation of Transportation II** (3) (Same as Law 408 (2))

271 **Readings and Research in Public Administration** (3) Staff

Advanced directed readings and research in specific areas. (Fall and spring)

273 **Colloquium: Public Administration and American Political and Social Institutions** (3) Cloutier

Supervised study in depth of contemporary literature in selected fields, and of research methodology in public administration. Primarily for doctoral candidates. (Fall)

274 **Trends in Public Administration Theory** (3) Harmon

Survey of contemporary normative and epistemological issues in public administration theory and practice. Analysis of the past and present influence of logical positivism, behavioralism, humanism, existentialism, phenomenology, and public interest theory. Required for doctoral candidates; open to advanced Master's degree candidates with permission of instructor. (Spring)

295 **Research Methodology** (3) Staff

Survey of research methods; application to problems of Public Administration. (Fall and spring)

* Special sections of this course offered in the Navy Graduate Financial Management Program.
† Students registering for P Ad 263 or 264 make special arrangements with the instructor for supplementary assignments equivalent to one additional semester hour. For description of the courses, see the *National Law Center* catalogue.

299 **Thesis Seminar** (3) Staff
Examination of thesis standards, research philosophy and methodology in Public Administration. (Fall and spring)

300 **Thesis Research** (3) Staff
(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Public Administration general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Public Administration candidates. May be repeated for credit. (Fall and spring)

Public and International Affairs

Professors A.E. Burns, R.H. Davison, J.W. Kendrick, C.E. Galbreath, R.B. Thompson, J.N. Mosél, W.C. Hopkins, F.H. Michael, Joseph Aschheim, H.L. LeBlanc, R.K. White (*Emeritus*), Andrew Gyorgy, Benjamin Nimer, R.P. Sharkey, C.T. Stewart, Jr., J.W. Robb, Helen Yakobson, H.C. Hinton, H.M. Sachar, George Stambuk, Henry Solomon, Vladimir Petrov, B.M. Sapin, Chung-wen Shih, R.K. Lewis, Ching-Yao Hsieh, Gaston Sigur, Marvin Gordon

Professorial Lecturers Joseph Baclawski, John Hardt, Tao-tai Hsia, Bernard Ramundo, Lothar Metzl, T.W. Wolfe, Eleanor Hadley, Abraham Halpern

Associate Professors P.P. Hill, W.R. Johnson, C.A. Moser, R.Y.C. Yin, J.K. McDonald, J.A. Morgan, Jr., C.F. Elliott, R.M. Dunn, Jr., Bernard Reich, Young Kim, Richard Thornton, C.A. Linden, Peter Poole, S.J. Wayne, J.M. Logsdon

Adjunct Associate Professor R.A. Young

Associate Professorial Lecturers Philip True, Horia Socianu

Assistant Professors G.C.Y. Wang, D.L. Lee, J.E. Fredland, R.E. Darcy, J.M. Starrels, P.L. Sargent (*Visiting*), Thomas Brewer, S.W. Burks, K.L. Storrs, S.A. Grant, P.F. Klarén, A.M. Yezer, H.R. Nau

Instructors Rachel Keith, Dana Fischer, R.L. Cole

Programs of study in Chinese Language and Literature, Chinese Studies, International Affairs, Public Affairs, and Urban Affairs leading to the degree of *Bachelor of Arts* and programs of study in International Affairs, Latin American Studies, Public Affairs, Russian Studies, and Science, Technology, and Public Policy leading to the degree of *Master of Arts* are offered by the School of Public and International Affairs (see pages 162–77).

INTERNATIONAL AFFAIRS

The following courses are offered only in the War College curriculum:

THIRD GROUP

250 **International Relations of Latin America** (3)

259 **Seminar: International Relations of Western Europe** (3)

260 **Fundamentals of National Power** (3)

261 **International and U.S. Foreign Policy** (3)

262 **National Security Policy of the United States** (3)

263 **Intercultural Relations** (3)

265 **Seminar: Diplomacy, Strategy, and Arms Control** (3)

287 **Power Politics in the Pacific** (3)

288 **Seminar: the United States and the Caribbean** (3)

289 **Seminar: Modern China** (3)

297 **Readings in International Affairs** (1, 2, or 3)

299–300 **Thesis Research** (3–3)

Religion

Professors R.G. Jones (*Chairman*), H.E. Yeide, Jr.
Associate Professor Dewey Wallace, Jr.
Assistant Professors Sonya Quitslund, A.J. Hiltebeitel
Assistant Professorial Lecturer M.S. Halpern

Bachelor of Arts with a major in Religion (Field-of-Study).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87.
2. Prerequisite courses—Rel 9, 10, and 59–60.

The coordinated field of knowledge upon which the student will be examined for his major examination at the end of the senior year includes the history and literature of the world's religions and the philosophical and ethical problems of religious thought. A student may elect to give special emphasis in his program to Christianity, Judaism, or the religions of India. A proseminar (Rel 199–200) assists the student in preparing for the major examination. A pamphlet containing a detailed description of the major is available in the offices of the Dean of Columbian College of Arts and Sciences and the Chairman of the Department of Religion.

Master of Arts in the field of Religion.—Prerequisite: the degree of Bachelor of Arts with a major in Religion from this University, or an equivalent degree.

Required: the general requirements, pages 92–99. Of the 24 semester hours of required courses (exclusive of the thesis), at least 12 must be in third-group Religion courses; a maximum of 9 may be in a closely related field outside the Department of Religion as approved by the Department. The Master's Comprehensive Examination must cover three fields (the thesis research must be on one of these three fields) selected from the following: the Old Testament, the New Testament, History of Christianity, History of Religion in America, Modern Religious Thought, Ethics, Sociology of Religion, and History of Religions. A reading knowledge examina-

tion, usually in French or German, is required; however, Hebrew or Greek is acceptable for those students whose thesis area is in the Biblical field and Sanskrit or an Eastern language for those whose thesis area is in the History of Religions.

Master of Arts in the field of Religious Education.—Prerequisite: the degree of Bachelor of Arts with a major in Religion from this University, or an equivalent degree. The undergraduate program should have included the following courses or equivalent: Anth 1; Educ 108; Psyc 1, 22, and 29; Sp&D 1 or 11.

Required: the general requirements, pages 92–99. Of the 24 semester hours of required courses (exclusive of the thesis), at least 6 must be in third-group Religion courses; a maximum of 12 may be in a closely related field outside the Department of Religion as approved by the Department.

*Master of Arts in the field of Religion and Medical Care**.—Prerequisite: (1) the degree of Bachelor of Arts with a major in Religion from this University, or an equivalent degree; (2) a first professional theological degree; or (3) acceptable academic work required of entering medical students who have not earned a Bachelor's degree, but who are pursuing the degree of Doctor of Medicine.

Required: the general requirements, pages 92–99. The program of study consists of 36 semester hours of approved course work with or without a thesis. Students must elect course work covering four fields selected from Clinical Pastoral Care, Religion, Sociology, Psychology, Health Care Administration, and Medicine. The course work in these fields must be distributed as follows: 12 semester hours each selected from two fields and at least 6 hours in Clinical Pastoral Care. The Master's Comprehensive Examination must cover three fields selected from the list above, one of which, as approved by the Department, must be outside of the Department of Religion. Supervised clinical education may be offered as a tool subject in lieu of the required reading knowledge examination in a foreign language.

Doctor of Philosophy in the field of American Religious History (*offered in cooperation with the Department of History*).—Required: the general requirements, pages 92–96, 99–101. The General Examination must cover four fields, including two from the Department of Religion (History of Religion in America and either Early Christianity or European Christianity since 1500) and two from the Department of History (generally American Social History and one other).

FIRST GROUP

Jones, Quitslund

9 The Old Testament (3)

Historical and literary study of the Old Testament with consideration of development of religious ideas, institutions, and outstanding personalities. (Fall)

Jones, Quitslund

10 The New Testament (3)

Study of New Testament literature from the standpoint of occasion, purpose, dominant ideas, and permanent values. Emphasis on approach, structure, and significance of the Gospels and Epistles. (Spring)

Yeo

21 Introduction to Religious Thought (3)

Traditional religious concepts, language of contemporary religion and modern scientific and secular intellectual tendencies, and the place of religion in today's society. (Fall and spring)

Wallace, Hiltebeit

59–60 History of Religions (3–3)

Origins, evolution, and contemporary status in historical context. Rel primitive religion and the religions of the East (Hinduism, Buddhis

* Certain courses in this program are offered only through Off-campus Centers of the College of General Studies.

Taoism, Confucianism, Shinto). Rel 60: religions of the West and Near East (ancient religions, Judaism, Christianity, Islam). (Rel 59 and 60—fall and spring)

SECOND GROUP

103 **The Prophets** (3)

Development of prophetism in the Old Testament; cultural, economic, psychological, and religious factors; elements of lasting value in the prophetic teaching. Study of selected prophets.

104 **The Life and Thought of Jesus** (3) Quitslund

Comprehensive study of the life and teachings of Jesus with critical attention to sources. (Fall)

105 **The Life and Thought of Paul** (3) Quitslund

Backgrounds of early Christianity, first-century religious and social conditions affecting the spread of Christianity, the life and journeys of Paul, Paul's presentation of the Christian faith. (Spring)

111 **Myth, Epic, and Novel** (3) Hiltebeitel

Exploration of the religious themes and cultural significance of literature: e.g., Indian and Babylonian epic; the Bible; Greek epic and drama; Dante and Milton; Dostoevsky, Kafka, Hesse, Faulkner, Beckett, and Clark. (Fall)

122 **Christian Ethics and Modern Society** (3) Yeide

Nature and principles of Christian life as developed by the Christian community; problems of personal conduct; application to family, social, and economic institutions. (Fall)

124 **Contemporary Movements in Theology** (3) Quitslund

Theological approach and systems of a selected number of modern theologians. (Spring)

126 **Western Mysticism** (3)

Study of the phenomenon of religious experience and of selected mystics in Judaism, Christianity, and Islam.

127 **Medicine, Religion, and Healing** (1) Staff

Total care concept. Importance of religion in medical practice for patient and physician. Concept of the professional man, the clergy's role in healing, religious perspective on issues in medical ethics. (Spring)

135 **History of Judaism to the Talmud** (3) Halpern

History and religious thought of the Jewish people from the Maccabean revolt to the compilation of the Talmud. (Fall)

136 **History of Medieval and Modern Judaism** (3) Halpern

History and religious thought of the Jewish people from the compilation of the Talmud to the present. (Spring)

137 **The Land of Israel and the Growth of the Western Religions** (6) Jones, Halpern

141–42 **Religious Education** (3–3)
Religious education in the home, church, and community; basic educational procedures and special techniques; organization and administration.

143 **Early Christianity and the Spiritual Life of the Ancient World** (3) Wallace
Rise and development of Christianity in relation to the culture, philosophy, mystery religions, and general religious life of the Graeco-Roman world to A.D. 500. (Fall)

144 **Medieval Faith and Symbolism** (3) Wallace
Christian life and thought in the Middle Ages: mystics, saints, popes, and philosophers. (Spring)

145 **Religious Currents in the Renaissance and Reformation** (3)
Transformation of Western man's understanding of his identity and destiny the end of the Middle Ages to the Age of Reason.

146 **Christianity in the Modern World** (3)
Changing religious styles and patterns since the Age of Reason as seen in from the end of the Middle Ages to the Age of Reason.

159 **Hinduism** (3) Hiltebeitel
Emergence of the structures of Hindu life and thought out of ancient Vedic religion, religious philosophy, role of Hinduism in Indian civilization. (Fall)

160 **Buddhism** (3) Hiltebeitel
Origin, development, and contemporary status of Buddhist life and thought; its impact on Asian civilization. (Spring)

161 **Islam** (3)
Origin, development, and contemporary status of Islamic life and thought its impact on the Near East.

162 **Symbolism in the History of Religions** (3)
Religious symbolism, myth, legend, and ritual in the religions of the world; various theoretical analyses. Wallace

172 **Religion in American Culture** (3)
Growth of religious bodies and institutions in relation to American culture, development of religious thought, and analysis of the contemporary religious scene. (Spring) Staff

199–200 **Proseminar: Readings for the Major** (3–3)
Readings and group discussions. (Academic year)

THIRD GROUP

209–10 **Seminar: Biblical Studies** (3–3) Jones
Main problems of Biblical literary, historical, and theological criticism

213 **Seminar: Inter-testamental Judaism** (3)
Historical and religious development of Judaism as seen in the Apocrypha

Pseudepigrapha, Dead Sea Scrolls, Philo, and early Rabbinism. (Spring)

*216 **Supervised Clinical Pastoral Education (I–A)** (6) Staff

Full-time program of clinical pastoral education in an approved center. Involvement in the responsibility for pastoral ministry is reviewed and evaluated in a peer-group context.

*217 **Supervised Clinical Pastoral Education (I–B)** (6) Staff

Continuation of Rel 216 with emphasis on pastoral and personal identity, sustained pastoral relationships, and pastoral methods and skills.

*218 **Supervised Clinical Pastoral Education (III–A)** (6) Staff

Responsibility in pastoral ministry is increased with emphasis on group work, interprofessional involvement, use of specific counseling methods, work with persons with special problems. Prerequisite: Rel 216 and 217; or equivalent.

*219 **Supervised Clinical Pastoral Education (III–B)** (6) Staff

Continuation of Rel 218 with emphasis on examination and review of administrative procedures, design of pastoral programs, and development of pastoral theology.

222 **Seminar: Christian Ethics** (3) Yeide

Important tendencies in ethical reflection of the contemporary Christian Church; contributions of social sciences to that reflection. (Spring)

*223 **Religious and Ethical Perspectives on Medical Problems** (3)

Religious and ethical questions in medical problems and medically related issues.

*225 **The Dynamics of Ministering to the Young Adult** (3)

Conceptual models of development of young adults from late adolescence; special problems of educational and military experience, vocational choice, marriage and the family, and physical, intellectual, emotional, and religious development. Encounter experience with persons and groups.

*227–28 **Advanced Studies in Pastoral Care** (3–3)

History and present state of methodologies and conceptual models of pastoral counseling and leadership in groups; supervised work in interfaith and multidisciplinary ministries.

235 **Seminar: Roman Catholicism in the Modern World** (3)

Important leaders and their ideas in selected development since 1500—doctrinal, spiritual, biblical, liturgical, and ecumenical.

237 **Seminar: Theological Analysis** (3) Quitslund

Historical and topical study of the development of important ideas in such areas as Christology, soteriology, and ecclesiology. (Fall)

241–42 **Seminar: Religious Education** (3)

Major problems in the practice of religious education.

* Offered through the College of General Studies at Off-campus Centers for students in the Master's degree program in the field of Religion and Medical Care.

262 **Seminar: History of Eastern Religions** (3) Hiltebeitel
Selected topics. (Spring: topic—the Religions of China and Tibet)

271 **Seminar: American Religious History to 1830** (3) Wallace
Religious thought and life during the Colonial and early National period. (Fall)

273 **Seminar: American Religious History since 1830** (3)
Religious thought and life from the Civil War to the present. Staff

291–92 **Readings and Research** (3–3)
Investigation of special problems. (Academic year) Staff

299–300 **Thesis Research** (3–3)
(Fall and spring)

Romance Languages and Literatures

Professors J.W. Robb, G.E. Mazzeo, J.A. Frey, J.L. Métivier, Jr., J.F. Burks (*Chairman*)
Associate Professors Mary Ann Coffland, Pilar Sáenz
Assistant Professors Elizabeth Neyman, G.P. Huvé, Julia Hicks, Maria Wilmeth, Shirley Barnett, Ines Azar, J.M. Thibault, Gregory Ludlow

Bachelor of Arts with a major in (1) *French Language and Literature,* (2) *Spanish Language and Literature,* or (4) *any approved combination selected from two of the preceding* (1), (2), (3), *fields (Field-of-Study* or *Departmental).*—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)

2. Prerequisite courses—Fren 1–2, 3–4, 9–10, or equivalent; or Span 1–2, 3–4, 9–10, or equivalent.

3. Required introductory literature courses—Fren 51–52 or 91–92, or Span 51–52 or 91–92.

4. Required for the major:

Field-of-Study major—there is no specific program of courses; however, the passing of the major examination is assumed to be a convincing demonstration that the student possesses the breadth, depth, and knowledge of his major in terms of semester hours, courses, and grades. A proseminar in each of the major fields assists the student in his preparation for the major examination.

Departmental major—(a) 6 to 12 semester hours selected from Fren 103, 108, 109–10, and 193; no more than 36 semester hours of second-group French literature courses; or (b) 6 to 12 semester hours selected from Span 109–10, 193, and one other approved Spanish language course; no more than 36 semester hours of second-group Spanish or Spanish American literature courses.

It is strongly recommended that students elect two courses in one other literature outside of their major field.

Master of Arts in the fields of (1) *French Literature,* (2) *Spanish American Literature,* and (3) *Spanish Literature.*—Prerequisite: the degree of Bachelor of Arts in the appropriate field from this University, or an equivalent degree.

Required: the general requirements, pages 92–99. The program of study consists of 24 semester hours of approved course work plus a thesis (equivalent to 6 semester hours), or with the approval of the Department a student may elect a program of study consisting of 36 semester hours of approved course work without a thesis.

Doctor of Philosophy fields of study in Romance Literatures.—Required: the general requirements, pages 92–96, 99–101. There are four fields: French Literature; Spanish Literature; Spanish American Literature; and any approved combination of French, Spanish, or Spanish American Literature.

Bachelor of Arts in Education with teaching fields in French and in Spanish.—Prerequisite: the Education curriculum, page 78.

Required: the French option or the Spanish option and the professional courses listed on pages 112–13, 117, 119.

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

FRENCH

Departmental prerequisite: Fren 3–4 or 6, or equivalent, is prerequisite to all second-group courses in French.

FIRST GROUP

1–2 **First-year French** (3–3) Burks and Staff

A year course: credit toward a degree at this University given on completion of Fren 2. For beginners. Pronunication, conversation, grammar, composition, reading of modern French prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester. (Fren 1 and 2—fall and spring)

3–4 **Second-year French** (3–3) Thibault and Staff

A year course: credit toward a degree at this University given on completion of Fren 4. Conversation, grammar, composition, reading in modern French prose, introduction to French civilization. Aural training, oral practice in language laboratory. Prerequisite: Fren 1–2 or two years of high school French. Laboratory fee, $17.50 a semester. (Fren 3 and 4—fall and spring)

6 **Second-year French** (6) Thibault and Staff

Lecture (3 hours), discussion (3 hours). Intensive course which covers material of Fren 3–4. Grammar review, reading, conversation. Prerequisite: two years of high school French with grades of *B* or better; Fren 2. (Spring)

9–10 **French Conversation and Composition** (3–3) Huvé and Staff

Prerequisite: Fren 4 or equivalent and permission of instructor. (Fren 9 and 10—fall and spring)

12 **French Conversation and Composition (Intensive)** (6) Huvé and Staff

Intensive course which covers material of Fren 9–10. Laboratory fee, $25.

49 **French for Graduate Students** (0) Staff

For graduate students preparing for reading examinations. No academic credit. Tuition fee, $258. (Fall and spring)

51–52 **Survey of French Literature** (3–3) Métivier and Staff

Readings in French literature from the Middle Ages to the present. Lectures, readings, recitations, and informal discussions. (Fren 51 and 52—fall and spring)

91–92 **Analyse de texte** (3–3) Thibault

Methodology and vocabulary of literary criticism; application of principles of *explication de texte* to selections from prose, drama, and poetry from the Renaissance to the present. (Academic year)

SECOND GROUP Huvé

103 **Pronunciation and Intonation** (3) Thibault

Recommended for majors. (Fall)

108 **Cours avancé de grammaire** (3) Huvé

(Spring)

109–10 **Advanced French Conversation and Composition** (3–3) Métivier

Fren 109: emphasis on diction. Fren 110: emphasis on style. Prerequisite: Fren 10 or equivalent and permission of instructor. (Academic year)

119–20 **French Literature of the Middle Ages and the Renaissance** (3–3) Burks

Literary history and the development of ideas. *Les chansons de geste*, courtly literature, satire, the theatre, lyric and didactic poetry; Rabelais, Montaigne, La Pléiade. Class analysis of texts, collateral readings.

121–22 **17th Century French Literature** (3–3) Ludlow

History, philosophy, criticism, letters, eloquence, drama, fiction, poetry. Class analysis of texts; collateral readings. (Academic year)

123–24 **18th Century French Literature** (3–3) Frey

History, philosophy, criticism, letters, drama, fiction, poetry, the "salons," idea of progress, idea of science. Class analysis of texts, collateral reading.

125–26 **19th Century French Literature** (3–3) Thibault, Coffland

Poetry, drama, and novel of the 19th century with emphasis on stylistic analysis. Offered in French, 1973–74 and alternate years; offered in English translation, 1974–75 and alternate years. (Academic year)

127–28 **20th Century French Literature** (3–3)

Fiction, poetry, and drama from 1900 to present. Chronological examination of authors, movements. Offered in English translation, 1973–74

and alternate years; offered in French, 1974–75 and alternate years. (Academic year)

129–30 **Contemporary French Literature** (3–3) Ludlow, Burks

193 **Cours de style** (3) Staff

Advanced grammar, composition, and stylistics. Open to both advanced undergraduate and graduate students. Recommended for majors and teachers of French.

199–200 **Proseminar: Readings for the Major** (3–3) Staff

Conferences and group discussions. (Academic year)

THIRD GROUP

202 **Theme et Version** (3) Staff

Limited to students in the Graduate School of Arts and Sciences; open to others only by permission of the graduate adviser. Required of all graduate students in the field of French Language and Literature. Analysis and translation of selected prose, passages, alternating between French and English; designed to teach students to write with precision and clarity. (Fall)

212 **Historical French Grammar** (3) Staff

Phonology, morphology, and syntax of Old French; its development from Vulgar Latin. Prerequisite: a second-group course in French literature. Knowledge of Latin useful.

213–14 **Medieval French Literature** (3–3) Staff

French literature to the end of the Middle Ages. Prerequisite: a second-group course in French literature.

221 **Special Problems in 16th Century French Literature** (3) Burks

May be repeated for credit.

226 **16th and 17th Century Philosophical Literature** (3) Burks

The emergence of a literature of ideas; emphasis on the thought of Calvin, Montaigne, Descartes, and Pascal.

229–30 **Literary Renaissance in Europe** (3–3) Burks

Study of the developments in the poetry of Italy, France, and England. (Academic year)

231–32 **Theatre in the 17th Century** (3–3) Staff

Survey of the development of theatrical arts and the drama. Research papers and reports. (Academic year)

234 **17th Century Nondramatic Literature** (3) Staff

Rationalism and the revolt against authority expressed in literature. Impact of nondramatic literature on the development of classical doctrine.

241 **The Rationalistic Current in the 18th Century** (3) Ludlow

The contribution of the *philosophes* to the intellectual evolution of France and Europe. (Spring)

242 **Seminar: the French Novel in the 18th Century** (3) Ludlow

244 **Special Problems in 18th Century French Literature** (3) Ludlow
May be repeated for credit.

253 **Special Problems in 19th Century French Literature** (3) Frey
May be repeated for credit. (The novel before 1857—fall; the novel after 1857—spring)

256 **19th Century French Literature** (3) Frey

258 **Special Problems in 19th Century French Poetry** (3) Frey
May be repeated for credit.

264 **Seminar: Modern Period** (3) Coffland

265 **20th Century French Theatre** (3) Coffland

266 **20th Century French Poetry** (3) Coffland
Background and development of poetry in the 20th century; *explication de texte* approach.

295 **Independent Reading and Research in French Literature** (arr.) Staff
For students preparing for the Master of Arts degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

ITALIAN

FIRST GROUP

1–2 **First-year Italian** (3–3) Wilmeth and Staff
A year course: credit toward a degree at this University given on completion of Ital 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern Italian prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester. (Academic year)

3–4 **Second-year Italian** (3–3) Wilmeth and Staff
A year course: credit toward a degree at this University given on completion of Ital 4. Conversation, grammar, composition, reading of modern Italian prose, introduction to Italian civilization. Aural training, oral practice in language laboratory. Prerequisite: Ital 1–2 or two years of

high school Italian. Laboratory fee, $17.50 a semester. (Academic year)

9–10 **Italian Conversation and Composition** (3–3) Wilmeth

Prerequisite: Ital 4 or equivalent and permission of instructor. (Academic year)

51–52 **Introduction to Italian Literature** (3–3) Wilmeth

Prerequisite: Ital 4 or equivalent. (Academic year)

THIRD GROUP

295 **Independent Reading and Research in Italian Literature** (arr.)

For students preparing for the Master of Arts or Doctor of Philosophy degree. May be repeated for credit. (Fall and spring)

PORTUGUESE

FIRST GROUP

31–32 **Intensive Portuguese** (3–3) Robb

Prerequisite: knowledge of one other Romance language. (Academic year)

SPANISH

Departmental prerequisite: Span 3–4 or 6, or equivalent, is prerequisite to all second-group courses in Spanish.

FIRST GROUP

1–2 **First-year Spanish** (3–3) Barnett and Staff

A year course: credit toward a degree at this University given on completion of Span 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern Spanish prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester. (Span 1 and 2—fall and spring)

3–4 **Second-year Spanish** (3–3) Barnett and Staff

A year course: credit toward a degree at this University given on completion of Span 4. Conversation, grammar, composition, reading of modern Spanish prose, introduction to Hispanic civilization. Aural training, oral practice in language laboratory. Prerequisite: Span 1–2 or two years of high school Spanish. Laboratory fee, $17.50 a semester. (Span 3 and 4—fall and spring)

6 **Second-year Spanish** (6) Neyman

Lecture (3 hours), discussion (3 hours). Intensive, accelerated course which covers material of Span 3–4. Grammar review, reading, conversation. Prerequisite: two years of high school Spanish with grades of *B* or better, or grades of *A* or *B* in Span 2. (Spring)

9–10 **Spanish Conversation and Composition** (3–3) Hicks and Staff
Prerequisite: Span 4 or equivalent and permission of instructor. (Span 9 and 10—fall and spring)

12 **Spanish Conversation and Composition (Intensive)** (6) Staff
Intensive, accelerated course which covers the material of Span 9–10. Laboratory fee, $25.

49 **Spanish for Graduate Students** (0) Hicks
For graduate students preparing for reading examinations. No academic credit. Tuition fee, $258. (Fall and spring)

51–52 **Survey of Spanish Literature and Civilization** (3–3) Barnett
Social, artistic, and cultural background of Spanish literature. Lectures, readings, recitations, and informal discussions. (Academic year)

91–92 **Explicación de textos** (3–3) Sáenz
Analytical introduction to Spanish and Spanish American literature. Method demonstrated and practiced on selected passages. (Academic year)

SECOND GROUP

109–10 **Advanced Spanish Conversation and Composition** (3–3) Mazzeo
Emphasis on diction and style. Prerequisite: Span 10 or equivalent and permission of instructor. (Academic year)

119–20 **Medieval Spanish Literature** (3–3) Staff
Survey by genre of the literature of the Middle Ages. (Academic year)

121–22 **Spanish Literature of the Golden Age** (3–3) Azor
Span 121: Renaissance and Baroque Spanish poetry, the Spanish *comedia*.
Span 122: narrative prose of the Golden Age.

123–24 **Cervantes: Don Quijote** (3–3) Azor
The *Quijote* and the novel as a literary genre: reality and fiction. (Academic year)

125–26 **Modern Spanish Literature** (3–3) Mazzeo
Prose, poetry, and drama of the 18th and 19th centuries. Class analysis of texts, collateral reading, lectures on literature and history. (Academic year)

127–28 **Contemporary Spanish Literature** (3–3) Sáenz
Prose and poetry of the 20th century. Class analysis of texts, collateral reading, lectures on literature and history.

129 **The Romantic Drama in Spain** (3) Mazzeo
Lectures on the Spanish Romantic Drama, class analysis of representative plays, collateral readings.

130 **The Modern Spanish Essay** (3) Mazzeo
Development of the Spanish essay from the 16th century; emphasis

the 18th and 19th centuries. Class analysis of texts, collateral reading, and lectures.

131 **The Generation of 1898** (3) Staff

Study of the various critical problems related to this renaissance of Spanish letters as a whole, and of its most representative figures and works.

135 **The Spanish Theatre of the Realist Period** (3) Barnett

Study and analysis of the works of Ventura de la Vega, López de Ayala, Tamayo y Baus, Echegaray, and Pérez Galdós.

141 **Introduction to Spanish American Literature** (6) Robb

Highlights of Spanish American literature through the colonial and modern periods. Of special interest to majors in Latin American Studies.

151–52 **The Spanish American Novel** (3–3) Robb

Development of the novel in Spanish America. Lectures, collateral reading, and class analysis of texts.

155–56 **Spanish American Literature to 1880** (3–3) Robb

Literature of Spanish America from the colonial period to the latter part of the 19th century. Lectures, collateral reading, reports, and class analysis of important works. (Academic year)

157–58 **Spanish American Literature since 1880** (3–3) Robb

Literature of Spanish America from 1880 to the contemporary period. Lectures, collateral reading, reports, and class analysis of important works.

193 **Curso de estilo** (3) Staff

Advanced grammar, composition, and stylistics. Open to both advanced undergraduate and graduate students. Recommended for majors and teachers of Spanish.

197–98 **Proseminar: Readings for the Major in Spanish American Literature** (3–3) Robb

Recommended for all majors. Conferences and group discussions. (Academic year)

199–200 **Proseminar: Readings for the Major in Spanish Language and Literature** (3–3) Mazzeo, Sáenz

Recommended for all majors. Conferences and group discussions. (Academic year)

THIRD GROUP

215 **Old Spanish Language and Literature** (3) Staff

221 **Seminar: Cervantes' "Don Quijote"** (3) Azar

Cervantes' literary theories, the *Quijote* and its relations with the other *novelas cervantinas* as different modes of representing reality in literary fiction (Fall)

224 **Seminar: Special Problems in Spanish Renaissance Literature** (3) Azar

Topic for 1973: 16th century novel. (Fall)

225 **Seminar: Special Problems in Golden Age Literature** (3) Azar

231 **Seminar: 18th Century Spanish Writers** (3) Mazzeo
Lectures and analysis of principal authors and works; relationships with subsequent literary movements.

242 **Seminar: Spanish Romanticism** (3) Mazzeo
Lectures and analysis of principal authors and works. Collateral readings. Problems of origins and developments.

244 **Seminar: Naturalism and the Spanish Novel** (3) Mazzeo
Development of Naturalism in 19th century Spain. Analysis of representative works of Pardo Bazán, Clarín, Blasco-Ibáñez, and others. (Fall)

246 **Seminar: Works of Galdós** (3) Barnett
Ideological and stylistic analysis: relationship of Galdós' works to literary movements of the second half of the 19th century. (Spring)

248 **Seminar: Spanish Lyric Poetry of the 20th Century** (3) Sáenz
Stylistic analysis of the most significant poets from 1898 to the present. (Spring)

250 **Novecentismo y Literatura de Entreguerras** (3) Sáenz
The prose writers: intellectualism and new forms of expression. (Spring)

251 **Seminar: Works of Unamuno and Ortega y Gasset** (3) Sáenz
Study of the thought of Unamuno and Ortega y Gasset; analysis and commentary on the texts.

252 **Spanish Literature since the Civil War** (3) Sáenz
Development of the Spanish novel in the last thirty years.

253 **Seminar: Studies in Modern Spanish American Poetry** (3) Robb

255 **Seminar: Studies in 20th Century Spanish American Theatre** (3) Robb
(Fall)

256 **Seminar: Studies in Mexican Narrative Prose** (3) Robb

261 **Seminar: Studies in Spanish American Essayists** (3) Robb
The Spanish American essay as an artistic form; selected modern essayists.

264 **Seminar: Studies in Recent Spanish American Fiction** (3) Robb
(Spring)

266 **Seminar: Alfonso Reyes** (3) Robb
Alfonso Reyes, the essayist-artist, poet, and complete humanist, as studied in his various prose and poetic works.

287 **Seminar: Problems in Latin American Civilization** (3) Gordon
Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on

some aspect of a selected key theme. Admission by permission of instructor. (Spring)

295 **Independent Reading and Research in Spanish and Spanish American Literature** (arr.)

For students preparing for the Master of Arts degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Sanskrit

See "Germanic Languages and Literatures."

Service-Learning Program*

Professor C.C. Mondale
Adjunct Assistant Professor J.L. Tropea
Instructor Rachel Keith

SERVICE-LEARNING EXPERIMENTAL HUMANITIES

SECOND GROUP

150 **Learning through Service** (3 to 15) Mondale and Staff

Open only to juniors and seniors. Students undertake an assignment with an off-campus agency or group. Arrangements are made through a "contractual" agreement among the student, the agency or group, and the Service-Learning Program, with the amount of credit depending upon the nature of the assignment. (Fall and spring)

* Administered by the Division of Experimental Programs.

SERVICE-LEARNING POLITICAL SCIENCE

SECOND GROUP

Keith

153 **Urban Policy-making** (6)

Study of urban policy-making process through readings, group discussions, research, and work in an urban-related political or governmental office. Prerequisite: P Sc 103 or 104. (Fall and spring)

Keith

154 **Law and Social Change** (6)

Study of the legal system and its role in promoting social change. Readings, group discussions, and work with lawyers and 3rd-year law students. (Fall and spring)

Keith

155 **American Political Behavior** (6)

Study of American political behavior through readings, group discussions, research, and work in a political or governmental office. (Fall and spring)

SERVICE-LEARNING SOCIOLOGY

SECOND GROUP

Tropea

151 **Problems of Urban Social Systems** (15)

Developing a comprehensive perspective on selected social problems through readings, lectures, research, and supervised field placements in the Washington, D.C., area. A maximum of 24 hours a week will be spent in service-research efforts. Topic changes each semester. Prerequisite: an accumulation of 24 semester hours among economics, history, political science, psychology, and sociology. Admission by permission of instructor. (Fall and spring)

Sino-Soviet Studies

See "Institute for Sino-Soviet Studies."

Slavic Languages and Literatures

Professor Helen Yakobson
Associate Professors Nadine Natov, C.A. Moser (*Chairman*), G.A. Olkhovsky, W.W. Rowe, Irene Thompson
Associate Professorial Lecturer Juri Jelagin
Assistant Professor M.A. Kandel
Adjunct Assistant Professor Mary Miller

Bachelor of Arts with a major in Russian Language and Literature (*Field-of-Study*) or *Bachelor of Arts with a major in Russian Literature and Culture—Translation* (*Field-of-Study*).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87, and the passing of the ajor is required to include in his first two years of study Slav 5–6 (preferred), minar to assist the student in his preparation for the major examination.

2. (a) *The Russian Language and Literature major.*—A student electing this ajor is required to include in his first two years of study Slav 5–6 (preferred), Slav 1–2 and 3–4, or equivalent; and Slav 91–92. By the end of the senior year e student will be expected to have a reasonable command of language skills and grasp of the fundamentals of Russian structure, as well as a good foundation in ssian literature and culture.

(b) *The Russian Literature and Culture—in Translation major.*—A student ecting this major is required to include in his first two years of study Slav 47 and , or Slav 1–2 and 3–4, or equivalent; and Slav 91–92. By the end of the senior ar the student will be expected to have a good grasp of Russian literature and the inciples of literary criticism, as well as a general knowledge of Russian culture d history.

A student who is already proficient in Russian language or literature, may, upon ssing an appropriate examination, waive any or all of the first-group language or erature courses, as well as up to 6 semester hours of second-group courses.

Master of Arts in the field of Russian Language and Literature.—Two areas of ncentration are offered: Russian literature or Russian language.

Prerequisite: the degree of Bachelor of Arts with a major in Russian Language d Literature or Russian Literature and Culture—in Translation from this Univer- y, or an equivalent degree. A student planning a concentration in Russian litera- re must have a good reading knowledge of the Russian language, a firm grasp of 9th and 20th century Russian literature, and an acquaintance with Russian history d culture. A student planning a concentration in Russian language must have a neral knowledge of the structure of the Russian language, proficiency in oral and ritten expression, and an acquaintance with 19th and 20th century Russian literature.

Required: the general requirements, pages 92–99. The program of study con- sts of 24 semester hours of approved course work plus a thesis (equivalent to 6 emester hours) or 36 semester hours of approved course work without a thesis (the Department may waive up to 6 semester hours in the 36-semester-hour program). Candidates electing the Russian literature concentration must include 6 semester hours of linguistics and at least 18 hours of literature; candidates electing the Russian language concentration must include 6 semester hours of literature and at least 18 hours of language and linguistics. All candidates must pass a reading knowledge examination in either French or German and must pass a Master's Comprehensive Examination in their area of concentration.

Bachelor of Arts in Education with a teaching field in Russian.—Prerequisite: the Education curriculum, page 78.

Required: the Russian option and the professional courses listed on pages 116–17, 119.

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

FIRST GROUP

1–2 **First-year Russian** (3–3) Yakobson and Staff

Beginners' course in fundamentals of grammar and pronunciation. Slav 1 is prerequisite to Slav 2. Laboratory fee, $17.50 a semester. (Slav 1 and 2—fall and spring)

3–4 **Second-year Russian** (3–3) Yakobson and Staff
Intermediate course in Russian language. Prerequisite to Slav 3: Slav 1–2 or two years of high school Russian. Prerequisite to Slav 4: Slav 3. Laboratory fee, $17.50 a semester. (Academic year)

5–6 **Intensive Beginning Russian** (6–6) Thompson
Classroom (10 hours), laboratory (1 hour). Beginners' intensive course in the fundamentals of Russian. Prerequisite to Slav 6: Slav 2 or 5. Laboratory fee, $17.50 a semester. (Academic year)

7–8 **Intensive Advanced Russian** (6–6) Miller
Emphasis on vocabulary expansion, systematic review of Russian grammar. Prerequisite to Slav 7: Slav 4 or 6, or equivalent. Prerequisite to Slav 8: Slav 7 or equivalent. (Academic year)

9–10 **Intermediate Russian Conversation and Composition** (3–3) Miller
Listening comprehension; oral and written practice. Prerequisite: Slav 4 or 6, or permission of instructor. (Academic year) Staff

31–32 **Elementary Polish** (3–3)
Beginners' course in the fundamentals of grammar and pronunciation. Slav 31 is prerequisite to Slav 32. Laboratory fee, $17.50 a semester. (Academic year 1974-75 and alternate years) Staff

41–42 **Elementary Serbo-Croatian** (3–3)
Beginners' course in the fundamentals of grammar and pronunciation. Slav 41 is prerequisite to Slav 42. (Academic year 1973–74 and alternate years) Staff

47 **Beginning Russian for Reading** (3)
For students with little or no knowledge of Russian who wish to learn to read the language only. Credit assigned only after completion of Slav 49. No academic credit for graduate students. (Fall) Staff

49 **Russian Reading** (3)
Primarily for graduate students preparing for reading examinations in the natural and social sciences. No academic credit for graduate students. Prerequisite: Slav 47 or equivalent. (Spring) Olkhovsky

71 **Introduction to Russian Civilization** (3)
Survey of Russia's artistic, social, and cultural development. Lectures, discussion, visual aids—in English. (Fall) Staff

91–92 **Introduction to Russian Literature** (3–3)
Emergence and development of Russian literature and ideas from earliest times to the early 20th century—in English. (Slav 91—fall; Slav 92—fall and spring)

SECOND GROUP

101–2 **Readings in Modern Russian** (3–3) Olkhovsky
Representative reading and translation of Soviet periodicals and selected texts in social sciences. Prerequisite: Slav 4 or 6, or equivalent. (Academic year)

109–10 **Advanced Russian Conversation and Composition** (3–3) Yakobson
Developing proficiency in oral and written expression. Prerequisite: Slav 10 or equivalent. (Academic year)

125 **Russian Linguistic Structure** (3) Thompson
Linguistic description of standard contemporary Russian. (Fall)

126 **Contrastive Russian-English Analysis** (3) Thompson
Introduction to the basic principles and methods of contrastive linguistics and their application to the analysis of Russian and English structure. (Spring)

128 **Dostoevsky, the Man and the Artist** (3) Natov
Sources and development of Dostoevsky's philosophical, religious, and aesthetic ideas. His influence on Russian and Western literature. Lectures, discussions, and reports—in English. (Fall)

131 **18th Century Russian Literature** (3) Moser
Survey course in the history of Russian literature from 1700 to approximately 1820—in English. (Fall 1974 and alternate falls)

141–42 **Russian Romanticism and Realism** (3–3) Natov
Masterpieces of Russian prose, poetry, and drama of the 19th century—in Russian. Prerequisite: Slav 4 or 6, or equivalent.

143–44 **The Russian Novel** (3–3) Rowe
Study of representative novels of the 19th and 20th centuries—in English. (Academic year)

146 **The Russian Short Story** (3) Natov
Historical development of the Russian short story. Lectures, reports, and class analysis—in Russian. (Spring)

151 **Russian Symbolism** (3) Natov
Class analysis of selected texts. Recitations and reports—in Russian. Prerequisite: Slav 4 or 6, or equivalent. (Fall)

152 **Russian Literature after the Revolution** (3) Natov
Russian literature from 1917 to the present; emphasis on poetry and drama. Analysis of selected texts, reports—in Russian. Prerequisite: Slav 4 or 6, or equivalent. (Spring)

153 **Turgenev** (3) Moser
Reading and discussion of Turgenev's works. Emphasis on the novels; major short stories analyzed and some time spent on his plays and other prose works—in English. (Fall)

156 **Leo Tolstoy, His Life and Works** (3) Rowe
Evolution of Tolstoy's artistic and philosophical ideas. Tolstoy's impact on Russian literature and society. Lectures, reports, and classroom analysis of his major works—in English. (Spring)

157 **Nabokov** (3) Rowe
Reading and discussion of the major creative works. Russian roots, ordering of reality, sexual symbolism—in English. (Fall)

158 **Solzhenitsyn** (3) Natov
Reading and discussion of the most important stories, novels, and plays by the outstanding contemporary Russian writer—in English. (Spring)

161–62 **Russian Culture** (3–3) Olkhovsky
Survey of Russian cultural heritage from origins of ancient Russia to present—in English. Lecture, recitation, discussion, and individual reports on assigned topics. (Academic year)

165 **Soviet Literature from the Revolution to World War II** (3) Kandel
Basic themes, issues, literary figures of the Soviet 1920's. The fate of literature and writers under increasing state control; Five-year Plan literature. Lecture, discussion, reports—in English. (Fall)

166 **Soviet Literature from World War II to the Present** (3) Kandel
Literature in wartime, under Stalinism, and in the "thaws." The new generation of dissident liberals and "underground" literature. Lecture, discussion, reports—in English. (Spring)

171 **The Russian Intelligentsia** (3) Olkhovsky
Main trends and figures in the evolution of Russian artistic and intellectual life of the 19th century—in English. Lectures, discussion, reports. (Spring)

193–94 **The Other Slavs: Their Literature—in English** (3–3) Kandel
An examination of non-Russian Slavic literatures from their beginnings to the present day. Emphasis on themes, ideas, and styles peculiar to each literature. (Academic year)

197 **Methodology of Teaching Russian** (3) Yakobson
Discussion of methods, examination of textbooks, observation of classroom procedures. Prerequisite: 18 semester hours of Russian language. (Spring)

198 **Russian Stylistics** (3) Natov
Development of the Russian language, literary styles, and techniques; words and their aesthetic value, phraseological units, word order, phrase structure. (Spring 1975 and alternate springs)

199–200 **Proseminar: Readings for the Major** (3–3) Staff
Conferences and group discussions. (Academic year)

THIRD GROUP

215 **History of the Russian Language** (3) Thompson
Historical phonology, morphology, and syntax of the Russian language. (Fall 1973 and alternate falls)

216 **Comparative Slavic Structure** (3) Thompson
Study of the structure of Russian as compared with other Slavic languages. Knowledge of a Slavic language other than Russian is helpful, but not required. (Spring 1974 and alternate springs)

225 **Pushkin and the Poets of His Time** (3) Natov

Pushkin's predecessors; Pushkin's lyrics and dramas. Lermontov—the heir to Pushkin's poetic tradition. (Fall 1973 and alternate falls)

253 **Seminar: Literary Criticism** (3) Natov

Study of leading Russian critics and their role in the development of Russian literature; the emergence of various literary schools. (Spring 1974 and alternate springs)

254 **Seminar: Literary and Intellectual Currents of the 1860's** (3) Moser

Discussion of literary and intellectual developments in the Russia of the 1860's. Course conducted in English; a reading knowledge of Russian required. (Spring 1975 and alternate springs)

255 **Seminar: Main Trends in 20th Century Russian Literature** (3) Natov

Study of representative works since 1900; their artistic and social value—in Russian. (Fall 1974 and alternate falls)

299–300 **Thesis Research** (3–3)

(Fall and spring)

Sociology

Professors R.W. Stephens, I.H. Cisin, R.G. Brown (*Chairman*), T.F. Courtless, Jr.
Professorial Lecturers E.E. Jacobson, H.L. Sheppard
Associate Professor Patricia Lengermann
Associate Professorial Lecturer Alison Wolf
Assistant Professors C.S. Harris, Phyllis Stewart, Ruth Wallace, William Martineau
Adjunct Assistant Professors J.L. Tropea, Eileen Zeitz
Assistant Professorial Lecturers W.R. Throckmorton, B.B. Dunning, D.S. Alterman

Bachelor of Arts with a major in Sociology (*Departmental*).—The following requirements must be fulfilled:
1. The general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Humanities and the Natural and Mathematical Sciences.)
2. Prerequisite courses—Soc 1 and 61.
3. Required courses in related areas—3 semester hours in Statisics (students should consult the departmental adviser regarding the appropriate course); 12 semester hours in *one* of the following related social science fields: Anthropology, Economics, Geography, History, Political Science, and Psychology.
4. Required courses in the major—Soc 141, 149; 18 additional semester hours in second-group Sociology courses.

Master of Arts in the field of Sociology.—Prerequisite: a Bachelor's degree with a major in Sociology or in an approved related field. Applicants should present scores on the Graduate Record Examination, preferably including the Advanced

Test in Sociology, and arrange for former professors to write letters of reference to the Graduate School of Arts and Sciences.

Required: the general requirements, pages 92–99. The minimum requirement consists of 24 semester hours of approved course work plus a thesis (equivalent to 6 semester hours). With the approval of the Department, a student may elect a program of study consisting of 36 semester hours of approved course work without a thesis. All degree candidates must include in their program of study Soc 230, 231, 238, 239, and Stat 105; and the satisfactory completion of a Master's Comprehensive Examination in three fields, including Sociological Theory, Sociological Research Methods, and one selected from Deviance, Political Sociology, Sociology of Work, Urban Sociology. All course work must be approved in advance by the adviser. Candidates must also fulfill the tool requirement by passing a reading knowledge examination in one foreign language or by satisfactorily completing the tool requirement in either Statistics or computer programming.

Doctor of Philosophy in the field of Sociology.—Required: the general requirements pages 92–96, 99–101. Students must pass the General Examination in four fields, including Sociological Theory, Sociological Research and Methods, and two selected from Deviance, Political Sociology, Sociology of Work, Urban Sociology.

Departmental prerequisite: Soc 1 is prerequisite to all second- and third-group courses in Sociology.

SOCIOLOGY

FIRST GROUP

1 **Introductory Sociology** (3)

General principles of sociology; development of culture and personality, impact of groups and institutions on man's social behavior. Survey of fields within sociology. (Fall and spring)

2 **American Social Problems** (3)

Analysis of major social problems confronting the United States; factors producing social problems, their nature and treatment. (Fall and spring)

61 **Development of Social Thought** (3)

Examination of concepts and theories relevant to the nature of society and human relationships from ancient writings to the 20th century. Prerequisite: Soc 1. (Fall and spring)

SECOND GROUP

110 **The Sociology of Work** (3)

Introductory survey of industrial sociology; sociology of occupations and professions; industry-community relations; and analysis of large, complex organizations. (Spring)

124 **Medical Sociology** (3)

Social factors and processes related to the etiology and treatment of physical and mental illness; medical occupations and professions, medical organizations, problems of delivery of health care services. (Fall)

125 **Sociology of Religion** (3) Wallace, Yeide

Introduction to history of the religious area of sociology; analysis of reciprocal impact of secular upon religious and religious upon secular institutions. (Fall)

126 **Urban Sociology** (3) Stephens

Place of the city in larger society; growth of the city, problems of urban living, group life, personality, urban housing, city planning, and suburban development. (Fall and spring)

127 **Population Problems** (3) Stewart

Composition of populations, trends in population growth and population pressure, factors producing population movements, effects of migration, population policies—eugenics and birth control. (Fall)

128 **Urban Problems and Policies** (3) Staff

Seminar on urban problems and policies developed in response to them; special focus on Washington, D.C.; students placed in Washington agencies; seminar sessions devoted to social-policy analyses of their experiences. (Spring)

129 **Race and Minority Groups** (3) Wallace

Analysis of relationships between dominant and minority groups in society, particularly in the United States; nature and range of problems; analysis of the phenomenon of prejudice. (Fall and spring)

130 **Social Stratification** (3) Stephens

Analysis of distribution of resources and opportunities for participation, education, and social mobility in American society; international comparisons; analysis of public policies which affect these distributions. (Spring)

132 **Political Sociology** (3) Becker, Lengermann

Analysis of problems involved in the study of power relations in society; distribution of power in society; types and processes of government; political participation and political mobilization. (Fall)

133 **Sociology of Education** (3) Tropea, Wallace

Analysis of educational systems from institutional perspectives and as agencies of socialization; relationships of education in general to society, including technological, communal, and subcultural components. (Fall)

134 **Marriage and the Family** (3)

Courtship as a social process, marriage and marital adjustment, development of the family, parent-child relations, family problems, disorganization, divorce, and family reorganization. (Spring)

135 **Juvenile Delinquency** (3) Courtless, Tropea

Factors producing delinquency, juvenile detention, the juvenile court, training schools, treatment of offenders. (Spring)

136 **Criminology** (3) Courtless, Tropea

Nature and distribution of crime as related to the development and operation of criminal law and various social and legal institutions in urban society. (Fall)

137 **Sociology of Law** (3) Courtless

Law as a social phenomenon and agency of social control. Problems of legal concepts, doctrines, and institutions. Prerequisite: Soc 136. (Spring)

139 **Society and the Deviant** (3) Tropea

Analysis of relationships of society, socialization, and deviancy. Social responses to deviancy and criminal offenders; rehabilitative programs in community, courts, and schools. (Fall) Cisin

141 **Social Research Methods** (3)

Introduction to scientific method in the development of social theory and the solution to social problems. Prerequisite: Stat 53 or 104. (Fall and spring) Harris

143 **Social Movements** (3)

General survey of the various forms of collective behavior (fads, panics, riots, social movements, etc.), and a more detailed study of the genesis, development, and decay of social movements and social revolutions. (Spring) Harris

144 **Public Opinion and Mass Communication** (3)

Communication process with emphasis on international communications, propaganda, and mass media; measurement of propaganda campaigns. (Fall) Stewart

147 **Problems of Bureaucratic Organization** (3)

(Formerly Complex Organizations)

Analysis of theories of and behavior in large, bureaucratic organizations and their impact on American social life. Supervised work-practice in the Washington, D.C., community. (Fall) Wallace

149 **Modern Sociological Theory** (3)

Systematic study of contemporary schools of sociological theory, both European and American development; evaluation of scientific contributions of each school. Prerequisite: Soc 61. (Fall and spring) Staff

191 **Current Emphases in Sociology** (3)

Analysis and evaluation of recent developments in the general field of sociology. Topic changes each year; may be repeated for credit. (Spring) Staff

195 **Research** (3)

Independent study and special projects. Open only to selected undergraduate students with promising academic records. Before a student is permitted to register for Soc 195, he must submit a written proposal of his plan of study for the approval of the Staff member of the Department who will be directing his research. (Fall and spring)

THIRD GROUP

210 **Theoretical Foundations of Political Sociology** (3) Lengermann

Sociological theory on the relationship of politics to the wider social system. Emphasis on concepts of power, alienation, ideology, politics, stability, conflict, and change. ((Fall)

211 **Seminar: Social Change** (3) Lengermann
Comparative study of political processes concentrating on political development in Third World Nations. (Fall)

212 **Seminar: Political Processes** (3) Lengermann
Sociological studies of political processes in the United States: distributions of power; political socialization, attitudes, participation, communication; social movements. Prerequisitee: Soc 210. (Spring)

220 **Religious Institutions in the United States** (3) Yeide
Structural variety of religious institutions and patterns of interaction between religious and secular institutions in contemporary American life. (Spring)

227–28 **Seminar: Urban Social Problems** (3–3) Stephens
Multidisciplinary seminar which examines the value context, strategies, and programs currently applied to the solution of major urban problems, with emphasis on the various perspectives and approaches developed through the social sciences, principally sociology. Soc 227: discussion and analysis of the development of social science approaches in contrast to other approaches. Soc 228: discussion and analysis of the current problems of interest and concern to students in the seminar. It is recommended that Soc 227 be taken before Soc 228. (Academic year)

230 **Social Research Methods** (3) Cisin
Translation of concepts into indices; analysis and interpretation of research results, measurement, scales and scoring, hypothesis testing. Prerequisite: Soc 141 or equivalent. (Fall and spring)

231 **Advanced Social Research Methods** (3) Cisin
Intensive study and evaluation of current trends in the methodology of social research. Discussion on individual student projects and recently published research. Prerequisite: Soc 230. (Spring)

233–34 **Seminar: Theory Construction and Application** (3–3) Tropea, Wallace
Critical examination of the elements of current theories in the social sciences with the major objective of developing general principles of theory construction; consideration of the functions of theory in sociological research. (Academic year 1974–75 and alternate years)

235 **Seminar: General Systems Theory** (3) Tropea
Interdisciplinary study of general systems theory. Systematic inquiry into implications of a behavioral/systems approach to analysis and management of societal problems, particularly urban problems. (Spring)

238 **Seminar: Development of Sociological Theory** (3) Lengermann
The development of sociology from the early 1800s to the 1920s. Intensive analysis of the classical theoretical statements. (Fall)

239 **Seminar: Modern Sociological Theory** (3) Lengermann, Wallace
Intensive examination and evaluation of contemporary schools of sociological theory in Europe and America. An advanced analysis of theoretical perspectives. Prerequisite: Soc 238. (Spring)

240 **Sociology of Occupations** (3) Brown, Harr
Analysis of occupational roles and structures; recruitment and trainin
adjustment problems at various career stages; interrelationships
stratification systems, life styles, and occupations. (Fall)

242 **Seminar: Problems in Medical Sociology** (3) Brow
Sociological analysis of various problems in the institution of medici
e.g., delivery of health care services, interprofessional relationships, co
munity mental health, etc. (Spring)

243 **Seminar: Industrial Sociology** (3) Sheppard, Harris, Stewa
Problems of organization of work in industry, government, busine
problems of decision-making, recruitment, allocation of authority, inf
mal organization, and inter-organizational relations. (Fall)

244 **Seminar: American Class Structure** (3) Stephe
Analysis of the class structure of American society in continuity a
change. Critical review of theories of class, of the methodology of cl
and of research reporting social and psychological correlates of cl
(Fall)

248 **Seminar: Organizational Theory and Behavior** (3) Harris, Stew
Advanced analysis of theory and behavior in complex organizations re
tive to defining organizations, examining basic social processes and th
relationship to the cultural environment. (Spring) Cour

*259 **Law and Criminology I: Search for the Causes of Criminal Behavior** (3) (Same as Law 475(2)) Cour

*261 **Law and Criminology II: Society's Responses to the Criminal Offender** (3) (Same as Law 476 (2)) Allen, Cou

*262 **The Police and the Community** (3) Co
(Same as Law 477 (2))

263 **Seminar: Law and Society** (3)
Selected problems in law as an instrument of social policy; empha
the organization of legal decision-making processes. (Spring
and alternate springs)

295 **Research** (arr.)
Independent study and special projects. Before a student is p
to register for Soc 295, he must submit a written proposal of
of study for the approval of the Staff member of the Departm
will be directing his research. May be repeated once for credi
(Fall and spring)

299–300 **Thesis Research** (3–3)
(Fall and spring)

* Students registering for Soc 259, 261, or 262 make special arrangements with the in
supplementary assignments equivalent to one additional semester hour. For description of
see the *National Law Center* catalogue.

URTH GROUP

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

ERVICE-LEARNING SOCIOLOGY

ECOND GROUP

151 **Problems of Urban Social Systems** (15) Tropea
Developing a comprehensive perspective on selected social problems through readings, lectures, research, and supervised field placements in the Washington, D.C., area. A maximum of 24 hours a week will be spent in service-research efforts. Topic changes each semester. Prerequisite: an accumulation of 24 semester hours among economics, history, political science, psychology, and sociology. Admission by permission of instructor. (Fall and spring)

Spanish

See "Romance Languages and Literatures."

Special Education

Professor Perry Botwin (*Chairman*)
Associate Professors R.S. Cottrell, Jr., Rita Ives
Assistant Professors M.G. Van Dyke, R.W. Prouty, J.R. Shotel
Instructors Miriam Barteaux, Mary Campbell, Florence McGarry
Lecturer Nona Flynn

Programs of study in Special Education leading to the degrees of *Bachelor of Arts in Education, Master of Arts in Education,* and *Doctor of Education* are offered by the School of Education (see pages 104–30).

SECOND GROUP

101 **Seminar: Dimensions of the Complementary Teaching Role** (3) Staff
Instructional experiences designed to refine the insights and competencies essential for successful operation of the complementary teaching model. (Fall)

102 **Teaching the Child with Special Needs: Methods and Materials** (3)

Laboratory course taught in an elementary public school. Students ob serve and participate in a demonstration seminar conducted by the in structor. Must be taken concurrently with S Ed 189. (Fall)

103 **Teaching the Child with Special Needs: Creative Programming** (3)

Continuation of S Ed 102. Concentration on the total programming o the child with special needs. Must be taken concurrently with S Ed 190 (Spring)

170 **Interpersonal/Intrapersonal Relationships for Teachers** (3)

Consideration of factors leading to successful interaction with children (Fall)

189 **Preprofessional Internship: Observing the Special Child in the Regular Class Milieu** (3)

(*Formerly Preprofessional Internship in Special Education I*)

Supervised internship in school setting. Emphasis on intensive study of child evidencing special needs. Must be taken concurrently with S Ed 190 (Fall)

190 **Preprofessional Internship: Inspecting a Continuum of Special Education Services** (3)

(*Formerly Preprofessional Internship in Special Education II*)

Fieldwork in several public school systems. Designed to expose the studen to the range of services falling within the scope of special education Must be taken concurrently with S Ed 103. (Spring)

197–98 **Special Study in Special Education** (3–3)

Individual or group study or research under the guidance of staff mem bers. Program and conferences arranged with adviser. Admission by permission of adviser. (Academic year)

199 **Internship in Complementary Teaching** (6)

(*Formerly Practium in Teaching Special Education*)

An intense internship designed to allow the neophyte complementa teacher to experience every phase of the operation of the complementa teaching model. Admission by permission of instructor. (Spring)

200 **Understanding Young Exceptional Children** (3)

Lecture and field experience. Basic concepts of early child developm as applied to special education. (Fall)

THIRD GROUP

201 **Introduction to Special Education** (3)

Survey course to acquaint prospective teachers with special education to help them become aware of the various educational modifications nec essary to accommodate children in a school program. (Fall)

222 **Special Education in the Regular Classroom** (3) McGarry

Special techniques and materials for regular classroom teachers to assist children who have learning and/or behavior problems; emphasis on specific, practical strategies and applications. Open to undergraduate seniors. (Spring)

240 **Educational Programming for Children with Behavioral Problems** (3) Van Dyke

Analysis of educational provisions for children with behavioral problems through study of ecological considerations in the light of contemporary special education theory. (Fall)

241 **Preprofessional Internship: Crisis/Resource Teaching** (6) Van Dyke, Campbell

(Formerly Preprofessional Internship: Children with Behavioral Problems)

Practicum experience early in the training sequence, consisting of observation of, and interaction with, children with behavioral problems. Under the direction of qualified teachers in a field setting. A minimum of 280 clock hours required. (Fall)

242 **Clinical Teaching of Children with Behavioral Problems** (3) Campbell

Lectures and discussions exploring various psychoeducational techniques of teaching children and adolescents with behavioral problems. (Fall)

250 **Specialized Techniques and Materials for Diagnostic-Prescriptive Teachers** (3) McGarry

Selected materials and techniques used in diagnostic-prescriptive teaching. Must be taken concurrently with S Ed 252. Admission by permission of instructor. (Fall)

251 **Psychosocial Factors in Diagnostic-Prescriptive Teaching** (3) Prouty

Psychosocial factors significant in the process of diagnostic-prescriptive teaching. Admission by permission of instructor. (Fall)

252 **Professional Internship for Diagnostic-Prescriptive Teachers** (6) McGarry and Staff

Supervised school experience in diagnostic-prescriptive teaching. Must be taken concurrently with S Ed 250. Admission by permission of instructor. A minimum of 280 clock hours required. (Fall)

253 **The Humanizing Curriculum in Diagnostic-Prescriptive Teaching** (3) McGarry

Curriculum concepts and modifications aimed at enhancing the classroom environment for learning and growth. Admission by permission of instructor. (Fall)

260 **Identification and Assessment of the Educational Needs of Young Children** (3) Ives

(*Formerly Diagnosis of the Educational Needs of Young Children*)

Observation-demonstration course designed in preparation for informal evaluation techniques. Admission by permission of instructor. (Fall)

261 **Methods for Teaching Young Impaired Children** (3) Barteaux
(*Formerly Special Methods for Teaching Young Children*)
Lecture, workshop, demonstrations. Specialized techniques, curricula, and materials used with young children. Students develop and experiment with new methods and materials. Admission by permission of instructor. Limited to 20 students. (Fall)

262 **Seminar: the Education of Young Exceptional Children** (3) Barteaux, Ives, Shotel
Weekly seminar dealing with concepts and topics pertinent to the education of young exceptional children. Admission by permission of instructor. (Spring)

263 **Introduction to the Education of the Severely and Multiply Handicapped** (3) Shotel
Survey of the characteristics and learning patterns of children with severe disabilities. Lecture and field experience. (Fall)

264 **Advanced Study in the Special Education of the Severely and Multiply Handicapped** (3) Shotel
Specialized programs, techniques, and methods for teaching children with severe disabilities. (Spring)

265 **Field Experience with Multiply Handicapped and Developmentally Disabled Young Children** (3) Ives
(*Formerly Utilization of Supportive Personnel in Early Educational Programs for Exceptional Children*)
A 3-week intensive field experience in an early childhood special education setting for students with no experience in this area. Supervised experience necessary for program articulation. Required for degree candidates in the specialization area of early childhood special education. Shotel

266 **Problems in Language Development in Exceptional Children** (3)
Introduction to the study of language acquisition and the application of current research on language of handicapped children. (Fall) Ives

267 **The Role of the Early Childhood Special Educator** (3) Barteaux
Examination of the spectrum of roles available in early childhood special education; emphasis on role expectations and psychosocial dynamics in the various settings. (Spring)

268 **Pre-school Planning for Children with Disabilities** (3) Barteaux
Lecture and field experiences. Application of learning patterns to the education of children with disabilities. (Fall) Shotel

269 **Clinical Teaching in Early Childhood Education** (3)
Supervised clinical internship in special education with young children. Admission by permission of instructor. (Fall) Shotel

270 **Adapting the Early Childhood Curriculum to Meet Special Needs** (3)
Review of the basic curriculum areas as they relate to the development of readiness skills in special education. (Spring)

289 **The Diagnostic Procedure** (3) Ives

Examination of the rationale, techniques, and tools essential to academic and psychosocial assessment. Designed to provide practice as well as familiarity with the diagnostic procedure. Admission by permission of instructor.

290 **Control and Management Techniques in the Classroom** (3) Staff

Examination of the theory, techniques, and tools essential for group control. Designed to provide practice as well as familiarity with the various theories of control of human behavior. Admission by permission of instructor.

291 **Practicum in Crisis/Resource Teaching** (9) Campbell

(*Formerly Practicum in Teaching Children with Behavioral Problems*)

Supervised student teaching in programs for children with behavioral problems. Under the direction of a qualified teacher and the supervision of the University staff. Minimum of 420 clock hours required. (Spring)

292 **Practicum in Teaching Young Children in Special Education** (6) Barteaux, Shotel, Ives

Supervised student teaching in special education in classrooms for young children. Minimum of 350 clock hours required. (Spring)

294 **Practicum in Diagnostic-Prescriptive Teaching** (6 or 9) Prouty, McGarry

Supervised field experience in diagnostic-prescriptive teacher programs. Minimum of 360 clock hours required. Admission by permission of instructor. (Spring)

297–98 **Individual Study in Special Education** (3–3) Staff

Individual study or research under guidance of staff member. Program and conferences arranged with adviser. Admission by permission of adviser. (Academic year)

303 **Administration and Supervision of Special Education** (3) Botwin

Philosophy and nature of special education; program organization, administration, and development. Surveying local-level needs; program evaluation and supervision. Admission by permission of instructor. (Spring)

304 **Recent Research and Trends in Special Education** (3) Cottrell

Emphasis on research methodology and considerations. The unique problems of doing research in special education. Procedures and sources for obtaining research funding. Admission by permission of instructor. (Spring)

306 **Counseling Families of Children with Special Needs** (3) Ives and Staff

Working with parents and community agencies in meeting the educational and social needs of young children. Admission by permission of instructor. (Spring)

342 **Seminar: Crisis/Resource Teaching** (3) Van Dyke

Topics and concepts relevant to an exploration of alternative models in

the education of children perceived as having learning/behavior pro
lems. Admission by permission of instructor. (Spring)

343 **Psychoeducational Diagnosis of Children** (3) Van Dy
Lecture and laboratory course designed to develop *educational* strateg
for children who present behavior or learning problems in the schoo
Admission by permission of instructor. (Fall)

350 **The Diagnostic-Prescriptive Teacher** (3) Prou
Rationale, operational models, techniques, and problems relevant to p
plementation of diagnostic-prescriptive teacher programs. Admission
permission of instructor. (Fall)

351 **Seminar for Diagnostic-Prescriptive Teachers** (3) Prou
Current practices in regular and special education as they affect the d
nostic-prescriptive teacher; emphasis on concurrent field experience. A
mission by permission of instructor. (Spring)

352 **Seminar: Special Education Consultant Programs in the Schools** (3) Prou
For school-based consultants in special education; focuses on in-sch
program development and recent trends in processes and procedures. A
mission by permission of instructor. (Fall)

370 **Intrapersonal Dynamics in Special Education** (3) Prouty, Van Dy
Small group exploration of intrapersonal factors essential to understa
ing roles and interpersonal techniques in teaching exceptional childr
Admission by permission of instructor. (Spring)

FOURTH GROUP

401 **Doctoral Mini-Seminar in Special Education** (1)
Participation in a small group with a selected faculty member, intens
study and discussion of an area of common interest in an informal
vironment providing for the exchange of ideas and optimum potential
personal and professional growth. Admission by permission of instruc
(Fall)

453–54 **Doctoral Internship: Special Education** (6–6)
Supervised professional internship in college teaching, administrat
supervision, or private agency function. Each internship individually
ranged. Admission by permission of adviser. (Academic year)

490 **Departmental Seminar in Special Education** (3)
(*Formerly Interrelated Doctoral Seminar: Special Education*)
Provides an opportunity for selected graduate students to develop, r
and demonstrate their skills and abilities in a small-group setting
fellow students and department faculty. Admission by permissio
instructor. (Spring)

491 **Dissertation Research** (arr.)
(Fall and spring)

Speech and Drama

Professors G.F. Henigan (*Chairman*) (*Director of Forensics*), E.L. Stevens, J.W. Hillis (*Director of Speech Pathology and Audiology*)
Professorial Lecturer Gilbert Herer
Associate Professors Lee Bielski, L.S. Bowling, W.M. Reynolds, S.G. James (*Director of Theatre*)
Assistant Professors Joan Regnell, J.P. Fox, Diane Brewer, N.C. Garner
Assistant Professorial Lecturers Jacqueline Dudley, Fairlie Arant
Instructors Dean Munroe, V.P. Parady

Bachelor of Arts with a major in Dramatic Art (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)
2. Prerequisite courses—Sp&D 1, 11, 32.
3. Required courses in related areas—24 semester hours of second-group courses outside the Department of Speech and Drama as approved by the major adviser. (Courses in dramatic literature offered in the Classics, English, and foreign language departments are strongly recommended.)
4. Required courses in the major—Sp&D 115, 151, 161–62, 165–66; 6 additional semester hours in second-group drama courses.

Bachelor of Arts with a major in Speech Communication (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)
2. Prerequisite courses—Sp&D 1, 11.
3. Required courses in related areas—6 semester hours in Psychology and 6 semester hours in Philosophy as approved by the major adviser; 12 to 18 semester hours in a single subject area outside the Department of Speech and Drama as approved by the major adviser.
4. Required courses in the major—Sp&D 112, 121, 126, 143, 144; 9 additional semester hours of second-group courses in the Department of Speech and Drama as approved by the major adviser.

Bachelor of Arts with a major in Speech Pathology and Audiology (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)
2. Prerequisite courses—Sp&D 1, 11.
3. Required courses in related areas—24 semester hours in courses outside the Department of Speech and Drama as recommended and approved by the major adviser.
4. Required courses in the major—Sp&D 101, 171; 18 additional semester hours in second-group courses in the Department of Speech and Drama as approved by the major adviser.

Master of Arts in the field of Speech Pathology and Audiology.—Prerequisite: the degree of Bachelor of Arts with a major in Speech Pathology and Audiology from

this University, or an equivalent degree, and the score on the Aptitude Test of the Graduate Record Examination.

Required: the general requirements, pages 92–99. The program of study consists of 24 semester hours of approved course work plus a thesis (equivalent to 6 semester hours), or with the approval of the Department, 36 semester hours of course work without a thesis. All students must satisfy the academic and supervised practicum requirements for the Certificate of Clinical Competence awarded by the American Speech and Hearing Association, and they must include Sp&D 275 in their program of study.

Master of Fine Arts in the field of Dramatic Art.—Prerequisite: the degree of Bachelor of Arts from this University, or an equivalent degree.

Required: the general requirements, pages 92–99. The program of study consists of 24 semester hours of second- and third-group course work in drama and dramatic literature plus the production and direction of a major three-act play, equivalent to 6 additional semester hours.

Bachelor of Arts in Education with a teaching field in Speech and Drama.—Prerequisite: the Education curriculum, page 78.

Required: the Speech and Drama option and the professional courses listed on pages 118–19.

Speech and Hearing Therapy: See Speech and Hearing Clinic, pages 51–52.

FIRST GROUP

A American Speech for Foreign Students (3)

Class limited to foreign-born students. Instruction in the formation of the sounds of spoken English, with emphasis on rhythm and inflection. International Phonetic Alphabet used. Recording fee, $5. (Fall and Spring)

1 Communicative Speaking and Listening (3) Henigan and Staff

Basic theories and principles of speech communication; composition, delivery, and criticism of speaking in interpersonal, group, and public situations. Recording fee, $2. (Fall and spring)

11 Voice and Diction (3) Bielski and Staff

Development of naturalness, correctness, and clarity in conversational speech. Analysis and correction of individual speech delivery faults through tapes and weekly performances. Recording fee, $4. (Fall and spring)

32 Oral Interpretation of Literature (3) Staff

Theory and practice in discovering and communicating orally the meaning in literature through analysis of form and content. Techniques of reading prose, poetry, and drama for listeners. Prerequisite: Sp&D 11. Recording fee, $2. (Fall and spring)

45 Understanding the Theatre (3) Parady

The art of the theatre; its literature, aesthetics, and mechanics. Contributions of the playwright, actor, director, and designer examined through lectures, visiting artists, class discussions, and attendance at theatrical performances. Primarily for nonmajors. (Spring)

49 Rhetoric in Political and Social Action (3) Reynolds

(Formerly Social Dynamics of Speech Communication)

Study of the use and abuse of rhetoric in contemporary political and

social movements. Influence of speech communication on opinion-making, examined by means of readings, guest speakers, and field projects. (Fall)

SECOND GROUP

101 **Acoustic Phonetics** (3) Brewer
Acoustics of speech production and perception; phonetics and phonemic transcription systems; their application in linguistic analysis with emphasis on disorders of speech and hearing. Laboratory fee, $17.50. (Fall)

111 **Business and Professional Speaking** (3) Stevens
Study of the communication process in business and professional speaking; practice in presenting technical reports; selling policies, programs, and services; interviews; conferences; speech in training and supervisory activities. Primarily for nonmajors. (Fall)

112 **Advanced Public Speaking** (3) Henigan
In-depth study of and practice in the principles and techniques of persuasive speaking, with emphasis on the psychological factors in audience analysis and adaptation. Prerequisite: Sp&D 1 or permission of instructor. (Spring)

115–16 **Acting** (3–3) James
Study and practice of fundamentals of acting technique: sense memory, improvisation, character analysis, role development. Prerequisite: Sp&D 32. (Academic year)

121 **Group Discussion and Conference Leadership** (3) Stevens
Process of thinking and problem-solving in committees and small groups; methods of leading discussions and conferences. Prerequisite: Sp&D 1 or permission of instructor. (Fall and spring)

125 **Training the Student Advocate** (3)
In-depth investigation into the theory and practice of coaching competitive forensics-debate, oratory, and extemporaneous speaking.

126 **Argumentation and Debate** (3) Reynolds
Study of the advocacy system; special emphasis on issue identification, use of evidence, and logical proof. Extensive practice in argumentative speaking. Prerequisite: Sp&D 1 or permission of instructor. (Spring)

127–28 **Advanced Debate Practice** (1–1)
Admission by permission of instructor, after one semester of satisfactory participation in intercollegiate debate program. May be repeated for a total of 4 semester hours of credit. (Academic year)

133–34 **Radio and TV Broadcasting** (3–3)
Study of the development of radio and TV industries, station organization and management, equipment, production techniques; practice in preparation and performance of radio programs. Recording fee for Sp&D 134, $5. (Academic year)

135–36 **Radio Workshop** (1–1)
Practical work in campus radio station. Admission by permission of instructor, after one semester of satisfactory participation in WRGW activi-

ties. May be repeated for a total of 4 semester hours of credit. (Academic year)

143 **Origins of Contemporary Rhetorical Theory** (3) Reynolds
(*Formerly History and Criticism of European Public Address*)
Study of rhetorical theory and method as they evolved in the Western world from the classical period to the present. (Fall)

144 **History and Criticism of American Public Address** (3) Reynolds
Study of American oratory from its pre-Revolution origins to the present day, interpreted in terms of issues and movements. (Spring)

151 **Stagecraft** (3) Munroe
Lecture (2 hours), laboratory (1 hour). Theories and practicum in the technical aspects of production. (Fall)

152 **Advanced Stagecraft** (3) Munroe
Lecture (2 hours), laboratory (1 hour). Theories and practicum in production, staging, and scenic design. Prerequisite: Sp&D 151 or permission of instructor. (Spring)

154 **Play Directing** (3) Garner
Fundamentals of play directing. Studies in dramatic composition, character analysis, casting, rehearsing, play analysis. Under supervision of instructor, students cast and prepare scenes for presentation. Prerequisite: Sp&D 115. Laboratory fee, $5. (Fall)

155–56 **Play Production Practice** (1–1) Staff
Practical work in theatre: assigned production duties, special projects under instructor's supervision. May be repeated for a total of 4 semester hours of credit. Admission by permission of instructor. (Academic year)

161–62 **Theatrical Styles** (3–3) Aran
Historical and critical study of significant plays and production methods. Sp&D 161: to the Restoration. Sp&D 162: since the Restoration. (Academic year)

165–66 **History of the Theatre** (3–3) Garner
An examination of the development and growth of the theatre from its beginnings to the present. Sp&D 165: Greek through Restoration. Sp&D 166: the 18th century to the present. (Academic year)

169 **Introduction to Creative Dramatics** (3) James
Study of philosophies and practices underlying dramatics with children; materials and methods for conducting improvised dramatic activities in elementary and secondary education. (Spring)

171 **Bases of Speech and Hearing** (3) Hills
Structural and functional foundations of speech production and reception. (Fall)

172 **Speech Pathology I** (3) Regn
Pathologies and therapeutic procedures in articulatory and voice disorders and cleft palate. Prerequisite: Sp&D 101, 171. (Fall)

173 **Speech Pathology II** (3) Fox

Pathologies and therapeutic procedures in stuttering and disorders of central or peripheral nervous systems. Prerequisite: Sp&D 101, 171. (Fall)

176 **Speech, Hearing, and Language Development** (3) Fox

Study of normal speech and auditory function from prenatal development through the emergence of language. (Spring)

182 **Introduction to Audiology** (3) Brewer

Overview of the field of audiology to include a review of sound and its properties, anatomy and physiology of auditory system, and methods and procedures of pure tone and speech audiometry. Prerequisite: Sp&D 101, 171. (Spring)

183 **Clinical Procedures in Speech and Hearing** (3) Regnell

Method, theory, and practice in preparation of therapeutic objectives and materials; practice and observation in speech and hearing evaluation. Prerequisite: Sp&D 172 or 182. (Fall and spring)

184 **Clinical Practice in Speech and Hearing** (arr.) Staff

Supervised case work in speech and hearing in the University Speech and Hearing Clinic and selected off-campus facilities. May be repeated for a total of 3 semester hours of credit. Prerequisite or concurrent registration: Sp&D 183. (Fall and spring)

188 **Aural Rehabilitation** (3) Brewer

Systems, principles, and methods of auditory training and speech reading, including development of lesson plans and their application in resolving communication problems of acoustically-handicapped individuals. Prerequisite: Sp&D 182. Laboratory fee, $7.50. (Fall)

*192 **The American Cinema** (3) Staff

History and criticism of American films. At least one film will be shown each week, on which there will be readings, discussions, and lectures. The course will enable the student to develop an ability to see and evaluate cinema techniques, to express the evaluation clearly in writing, and to understand the role of films in the context of American culture.

193 **Design** (3) Munroe

Fundamental study of principles and concepts of theatre design. (Fall)

195 **Costuming** (3) Parady

Study of costume history, materials, and construction. (Spring)

THIRD GROUP

215–16 **Advanced Acting** (3–3) James

Study of character analysis, transactional analysis, exercise principles, improvisation, and styles. (Academic year 1974–75 and alternate years)

* Joint offering of the Department of Speech and Drama and the American Studies Program. Students may register under either designation.

251 **Advanced Design** (3) Munroe
Fundamental study of principles and concepts of theatre design. (Spring 1975 and alternate springs)

252 **Advanced Costuming** (3) Parady
Study of costume history, materials, and construction. (Spring 1974 and alternate springs)

255 **Lighting** (3) Garner
Theory and practice of stage lighting. (Fall 1973 and alternate falls)

256 **Advanced Directing** (3) James
Play analysis, character analysis; directing of scenes and one-act plays under supervision. (Spring 1974 and alternate springs)

257 **Modern Trends** (3) James
Study of recent trends in theatrical criticism, theory, and play production. (Fall 1974 and alternate falls)

258 **Theatre Management** (3) Parady
Theory and practice in the psychology of handling the public: promotion, box office and house management. Admission by interview. (Fall 1973 and alternate falls)

275 **Research Methods in Speech Pathology and Audiology** (3) Hillis
Clinical interpretation of research literature in speech pathology and audiology; application of research methodology in the management of speech, language, and hearing disorders. (Spring)

277 **Advanced Clinical Procedures in Speech and Hearing** (arr.) Staff
(Fall and spring)

278 **Advanced Clinical Practice in Speech and Hearing** (arr.) Staff
(Fall and spring)

279 **Anatomy and Physiology of Speech and Hearing** (3) Bowling
Study of structures and pathologies of speech and hearing. Laboratory fee, $15. (Fall)

280 **Neurological Speech and Language Disorders** (3) Fo
Evaluation and therapy for speech and language disorders resulting from neurological pathology: aphasia, apraxia, dysarthria, and related disorders. Laboratory fee, $7.50. (Fall)

281 **Advanced Clinical Audiology** (3) Bowling
Principles and methods underlying assessment of auditory disorders; emphasis on bone conduction, masking, and speech intelligibility. Clinical implications, tests, demonstration, and practicum. Laboratory fee, $7.50. (Fall)

282 **Special Auditory Tests** (3) Bowling
Special speech and pure tone audiometric techniques for differentiating conductive, cochlear, and retro-cochlear lesions, for identifying functional hearing losses. Clinical application of tests and interpretation of results. Laboratory fee, $7.50. (Spring)

283 **Community Programs in Speech and Hearing** (3) Herer
Methods and procedure for management of hearing and speech programs; review of hearing conservation and monitoring programs and operational aspects of clinical programs. Laboratory fee, $7.50. (Fall)

284 **Disorders of Articulation** (3) Hillis
Consideration of pathologies and treatment of disorders of speech articulation; emphasis on current treatment procedures. Laboratory fee, $7.50. (Spring)

285 **Hearing Aids** (3) Brewer
Discussion of hearing-aid characteristics and electroacoustic measurements; hearing-aid effectiveness in improving communicative efficiency; procedures for selection and clinical evaluation of hearing aids; counseling of the patient. (Spring)

286 **Disorders of Voice and Resonance** (3) Hillis
Consideration of pathologies and treatment of disorders of voice and resonance; emphasis on current treatment procedures. Laboratory fee, $5. (Fall)

288 **Psychosocial Aspects of Hearing Loss** (3) Bowling
Consideration of the rationale and procedures for evaluating the social and emotional behavior as well as the intellectual potential of those with impaired hearing. Laboratory fee, $7.50. (Spring)

291 **Seminar: Speech Pathology** (3) Staff
Current topics in speech and language pathology. May be repeated for credit. (Spring)

292 **Seminar: Audiology** (3) Staff
Offered in such areas as theories of audition, special auditory tests, aural rehabilitation, psychoacoustics. May be repeated for credit. (Spring)

293 **Stuttering and Related Disorders** (3) Hillis
Consideration of pathologies and treatment of dysrhythmic speech function; emphasis on current treatment procedures. (Fall)

294 **Independent Research in Dramatic Art** (arr.) Staff
May be repeated for credit. (Fall and spring)

295 **Independent Research in Speech and Hearing** (arr.) Staff
May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Statistics

Professors H.F. Bright, Solomon Kullback (*Emeritus*), H.W. Lilliefors, A.D. Kirsch, Herbert Solomon (*Chairman*), R.H. Shumway, Jerome Cornfield, J.L. Gastwirth

Professorial Lecturers Samuel Greenhouse, Morton Kupperman, W.W. Wolman
Associate Professor C.T. Ireland
Associate Professorial Lecturers M.A. Schwartz, Fred Frishman
Assistant Professor R.E. Thomas
Adjunct Assistant Professor J.K. Kern
Lecturers William Rutiser, T.C. Teeples

Bachelor of Arts or *Bachelor of Science with a major in Applied Statistics (Departmental)* or *Mathematical Statistics (Departmental).*—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 82–87. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Humanities and Social Studies.)

2. Prerequisite courses for both majors—Math 31, 32; Stat 91, 97.

3. (a) Required course in related areas for the Applied Statistics major—Math 124. (Courses in computer science and some field of application are recommended. Foreign language is not required for this major.)

(b) Required courses in related areas for the Mathematical Statistics major—Math 124, 139, 140, 157; two years of introductory French, German, or Russian, or equivalent. (Courses in computer science, mathematics, and some field of application are recommended.)

4. (a) Required courses in the Applied Statistics major—Stat 113, 117, 118, 157–58, 189; plus three approved second-group courses in Statistics.

(b) Required courses in the Mathematical Statistics major—Stat 117, 118, 157–58, 189–90; plus three approved second-group courses in Statistics.

To assure a balanced program, departmental approval of electives is required for both majors.

Master of Science in the field of Applied Statistics or *Master of Arts in the field of Mathematical Statistics.*—The program of study consists of 30 semester hours of course work without a thesis. In exceptional cases the Department may approve a program of study consisting of 24 semester hours of course work plus a thesis, equivalent to 6 additional semester hours. Candidates must pass a written Master's Comprehensive Examination and must fulfill the tool requirement by passing either a reading knowledge examination in an acceptable foreign language or an examination in computer language. The successful completion of course work in computer programming does not obviate the requirement to pass a special examination should the computer option be elected as a tool. For prerequisites and additional requirements, see below.

Master of Science in the field of Applied Statistics.—Prerequisite: a Bachelor's degree with a major in Applied Statistics from this University, or an equivalent degree. If undergraduate study did not include equivalent required courses at this University, those courses must be taken as prerequisite to graduate study.

Required: the general requirements, pages 92–99, including 18 semester hours of Statistics and 12 additional hours of approved course work in an area of interest to the candidate. Courses are selected in consultation with the adviser.

Master of Arts in the field of Mathematical Statistics.—Prerequisite: a Bachelor's degree with a major in Mathematical Statistics from this University, or an equivalent degree. If undergraduate study did not include equivalent courses at this University, those courses must be taken as prerequisite to graduate study.

Required: the general requirements, pages 92–99, including Stat 201–2 or 257–58, and 217–18. The remaining 18 semester hours must be selected in consultation with the adviser.

Doctor of Philosophy in the field of Mathematical Statistics.—Prerequisite: the

degree of Master of Arts in the field of Mathematical Statistics from this University, or an equivalent degree.

Required: the general requirements, pages 92–96, 99–101. A minimum of 24 semester hours of course work must be taken in residence at this University before the General Examination may be completed. The General Examination consists of an oral examination following four days of written examinations: Part I—Matrix Algebra, Real and Complex Analysis; Part II—Probability; Part III and Part IV—Mathematical Statistics. The first two parts of the General Examination may be taken after successful completion of Stat 259–60 or its equivalent; the third and fourth parts may be taken after completion of Stat 257–58, 263–64, 265–66, and a 3-semester-hour seminar. The tool requirement may be fulfilled by passing a reading knowledge examination in one foreign language and an examination in computer language. The successful completion of course work in computer programming does not obviate the requirement to pass a special examination should the computer option be elected as a tool.

Research Fields: Applied Probability, Biostatistics, Design of Experiments, Econometrics, Information Theory, Multivariate Analysis, Operations Analysis, Sampling, and Statistical Inference.

Departmental prerequisite: One entrance unit in algebra is prerequisite to all first-group courses in Statistics.

FIRST GROUP

49 **The Language of Statistics** (0) Staff

For Master's candidates and doctoral students in the Graduate School of Arts and Sciences as a minimum option in lieu of a foreign language. No academic credit. Tuition fee, $258.

*51 **Introduction to Business and Economic Statistics** (3) Staff

Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, time series, index numbers. Laboratory fee, $18. (Fall and spring)

*53 **Introduction to Statistics in Social Science** (3) Staff

(Formerly Introduction to Statistics in Psychology and Education)

Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, analysis of variance. Laboratory fee, $18. (Fall and spring)

*91 **Principles of Statistical Methods** (3) Staff

Lecture (3 hours), laboratory (1 hour). Variables and attributes, averages and dispersion, frequency distributions and their characteristics, regression and correlation, statistical decision processes. Laboratory fee, $18. (Fall and spring)

97 **Introduction to Computer Programming** (3) Thomas and Staff

Lecture (2 hours), laboratory (2 hours). Computer and programming

* Stat 51, 53, and 91 are related in their subject matter, and credit hours for only one of the three may be applied toward a degree.

concepts. High-level language programs written by students will be run on the University computer. Laboratory fee, $25. (Fall and spring)

SECOND GROUP

*104 **Statistics in the Behavioral Sciences and Education I** (3) Staff
Lecture (3 hours), laboratory (1 hour). Introductory study of statistical techniques for research problems in behavioral sciences and education. Laboratory fee, $18. (Fall)

105 **Statistics in the Behavioral Sciences and Education II** (3) Kirsch
Lecture (3 hours), laboratory (1 hour). Advanced study of statistical techniques for research problems. Analysis of variance, correlation techniques, nonparametric techniques, sampling theory. Prerequisite: Stat 53 or 104. Laboratory fee, $18. (Fall and spring)

107 **Statistics for Engineers** (3) Staff
Probability models, discrete and continuous distributions, sampling, hypothesis testing and estimation, engineering applications. Prerequisite: differential and integral calculus.

109–10 **Quality Control and Reliability Techniques** (3–3) Staff
Statistical methods and probability models for quality control and reliability applications. Prerequisite: Stat 91 or 107.

111 **Business and Economic Statistics I** (3) Staff
Statistical processes as tools in decision-making in areas of economics and business. Admission by permission of instructor. (Fall)

112 **Business and Economic Statistics II** (3)
Case work to illustrate quantitative procedures for solution of economic and business problems. Prerequisite: Stat 111 or equivalent. (Spring) Thomas and Staff

113 **Computer Programming** (3)
Lecture (2 hours), laboratory (2 hours). Computer concepts beyond the introductory level; an introduction to assembly language and advanced high-level language programming. Prerequisite: Stat 97. Laboratory fee, $25. (Spring) Staff

117 **Analysis of Variance** (3)
Lecture (3 hours), laboratory (1 hour). Introduction to the design of experiments and analysis of variance; random block, factorial, Latin square, and analysis of covariance. Prerequisite: Stat 118. Laboratory fee, $18. (Fall and spring) Staff

118 **Regression Analysis** (3)
Lecture (3 hours), laboratory (1 hour). Regression and correlation theory; simple, partial, and multiple. Prerequisite: 3 semester hours selected from Stat 51, 53, 91, 104, 107. Laboratory fee, $18. (Fall) Kerr

119 **Bases of Statistical Decision-making** (arr.)
For students in the Navy Graduate Financial Management Program only.

* May not be taken for credit by students who have received credit for Stat 51, 53, or 91.

Introduction to techniques of decision-making; emphasis on applications rather than theory.

122 **Forecasting Principles and Techniques** (3) Staff

Survey and appraisal of current economic forecasting techniques and indicators of business conditions. Preparation of an actual forecast. Prerequisite: Stat 51 or equivalent.

*123 **Introduction to Econometrics** (3) Bennett

Construction and testing of economic models: regression theory, parameter estimation, and statistical techniques applicable to economic models. Prerequisite: Econ 101, 102; Math 31 or 51; Stat 111. (Spring)

131 **Contingency Table Techniques** (3) Kullback

Analysis of multidimensional contingency tables, including estimation, tests of hypotheses, and log-linear regression. Prerequisite: Stat 118 or permission of instructor. (Fall)

155 **Introduction to Probability** (3) Staff

Probability distribution, Bayes' theorem and postulate, mathematical expectation, laws of large numbers. Prerequisite: one entrance unit in algebra.

157–58 **Introduction to Mathematical Statistics** (3–3) Staff

Distribution theory, sampling theory, estimation, hypothesis testing, regression analysis, experimental design. Prerequisite: differential and integral calculus. (Academic year)

159 **Principles of Bayesian Statistics** (3) Staff

Lecture (3 hours), laboratory (1 hour). Probability as a measure of uncertainty of knowledge; concepts and techniques of Bayesian inference. Prerequisite: 3 semester hours in introductory statistics, or equivalent. Laboratory fee, $13.

161–62 **Information Theory** (3–3) Kullback

Elementary development of information theory and applications to communication, coding, psychology, linguistics, etc. Prerequisite: 3 semester hours selected from Stat 107, 155, 157, 159, 189.

165–66 **Multivariate Techniques** (3–3) Staff

Application of multivariate statistical techniques to multidimensional research data from the behavioral, social, biological, medical, and physical sciences. Prerequisite: Stat 117, 157–58. (Academic year)

183 **Intermediate Statistical Laboratory** (3) Staff

Applications to advanced experimental design and other topics. Admission by permission of instructor. Laboratory fee, $25 (Fall or spring)

187 **Theory of Sampling** (3) Staff

Problems of sampling and sample design. Prerequisite: Stat 91 or equivalent. (Fall)

* An interdepartmental course offered by the departments of Statistics and Economics.

188 **Nonparametric Statistical Inference** (3) Lilliefors
Statistical inference when the form of underlying distribution is unspecified. Prerequisite: Stat 91 or equivalent. (Spring)

189–90 **Mathematical Probability and Applications** (3–3) Staff
Combinatorial analysis, conditional probability, stochastic independence, probability distributions, random variables, laws of large numbers. Prerequisite: differential and integral calculus. (Academic year)

191 **Probabilistic Methods for Operations Research** (3) Staff
Primarily for students in the School of Engineering and Applied Science. Axiomatic theory, random variables, Bayes' theorem, some special distributions, generating functions, convergence, Poisson and Markov processes. Prerequisite: Ap S 115 or equivalent. (Fall)

192 **Statistical Methods for Operations Research** (3) Staff
Primarily for students in the School of Engineering and Applied Science. Sampling, estimation, sampling distributions, hypothesis testing, the general linear hypothesis, experimental design models, elements of sequential analysis and nonparametric statistics. Prerequisite: Stat 191 or equivalent. (Spring)

195 **Reading and Research in Statistics** (arr.) Staff
May be repeated once for credit. (Fall and spring)

197 **Digital Computer Programming with Applications** (3) Thomas
Lecture (2 hours), laboratory (2 hours). Use of digital computer in statistical and other computational work. Writing, debugging, and running programs on the digital computer in the University Computer Center. Prerequisite: Stat 117; or Math 32; or permission of instructor. Laboratory fee, $25. (Spring)

198 **Current Topics in Computer Programming** (3) Staff
(This course replaces former Stat 114 Introduction to Computer Operating Systems (3) and Stat 115 Programming Languages (3))
Concepts of programming, programming languages, operating systems, nonnumeric programming, compiler techniques. Prerequisite: Stat 113 or permission of instructor. Laboratory fee, $25. May be repeated for credit. (Fall)

THIRD GROUP

201–2 **Mathematical Statistics** (3–3) Staff
Distribution theory, sampling theory, estimation, sufficient statistics, hypothesis testing, analysis of variance, multivariate normal distribution. Prerequisite: advanced calculus. (Academic year)

203–4 **Statistical Models in Behavioral Sciences** (3–3) Solomon
(Formerly Stat 193–94)
Analysis of models in factor analysis, mental testing, social and psychological processes, equilibrium states, Poisson processes, etc. Prerequisite: Stat 157–58, 189–90. Kirsch

206 **Factor Analysis** (3)
Concepts of factor analysis and their utility in various phases of research and related topics. Prerequisite: Stat 105 or equivalent. Laboratory fee, $18. Not open to graduate students in Statistics.

207–8 **Operations Analysis** (3–3) Staff

Basic concepts and techniques. Introduction to simulation, linear programming, game theory, queuing theory, inventory theory, and other topics. Admission by permission of instructor. (Academic year)

217–18 **Advanced ANOVA and Experimental Design** (3–3) Staff

Advanced theory and application of general linear hypothesis to experimental designs. Prerequisite: Stat 157–58 or 201–2. (Academic year)

221 **Design of Experiments for Behavioral Sciences and Education** (3) Kirsch

Applications of advanced experimental design to research problems in behavioral sciences and education. Prerequisite: Stat 105 or 117 and permission of instructor. Not open to graduate students in Statistics. (Spring)

225–26 **Introduction to Biostatistics** (3–3) Cornfield

(Academic year)

231 **Contingency Table Analysis** (3) Staff

A study of the theoretical bases underlying the analysis of categorical data. Prerequisite: Stat 201–2 or 257–58.

257–58 **Distribution Theory** (3–3) Staff

Random variables, distribution functions, moments, sequences of random variables, characteristic functions, special distributions, sampling theory, asymptotic distributions. Prerequisite: Stat 157–58 or 201–2. (Academic year)

259–60 **Advanced Mathematical Probability** (3–3) Staff

Measure theory, probability spaces, random variables, probability distributions, sequences of random variables, conditioning, martingales. Prerequisite: Stat 189–90.

261–62 **Geometrical Probability and Applications** (3–3) Solomon

Distribution of points in Euclidean space, random lines in a plane or space, convergence, random packing, integral geometry, and convex plane figures and surfaces. Applications in astronomy, physics, biology, chemistry, traffic, etc. Prerequisite: Stat 189–90, 201–2.

263–64 **Topics in Statistical Inference** (3–3) Staff

Estimation, testing of statistical hypotheses, tests of significance, likelihood ratio, Bayesian inference and the use of prior knowledge, decision and information theory. Prerequisite: Stat 201–2 or 257–58. (Academic year)

265–66 **Multivariate Analysis** (3–3) Staff

Tests of significance, homogeneity, independence, canonical and vector correlations, multivariate normal distribution, generalized Student's ratio, multivariate linear hypothesis, and analysis of variance. Prerequisite: Stat 201–2 or 257–58. (Academic year)

267–68 **Characteristic Functions** (3–3) Staff

Fourier integrals, distribution functions, inversion formulas, limit theo-

rems, applications to the distribution problem of statistics. Prerequisite: Stat 189–90; 201–2 or 257–58.

Staff

269–70 **Statistical Decision Theory** (3–3)

Wald's theory of decision functions. Sequential analysis. Multi-decision problems. Existence theorems, complete class theorems, and other general decision theoretic results. Prerequisite: Stat 189–90; and 201–2 or 257–58.

Kullback

271–72 **Statistical Information Theory** (3–3)

Informational properties of sub-sigma-algebras of the fundamental probability space. Prerequisite: Stat 201–2 or 257–58; and 259–60. (Academic year)

Lilliefors

273–74 **Markov Processes** (3-3)

Fundamental notions of Markov chains and processes, generating functions, recurrence, limit theorems, random walks, Poisson processes, birth and death processes, applications. Prerequisite: Stat 189–90; and 201–2 or 257–58.

Bennett

*275 **Econometrics I: Introduction** (3)

Single equation models of economic behavior. Statistical methods for testing economic hypotheses and estimating parameters. Introduction to simultaneous equations problems. Prerequisite: Stat 157–58 or equivalent, or permission of instructor. (Fall)

Bennett

*276 **Econometrics II: Simultaneous Equations Models** (3)

Economic models and simultaneous equations systems. Prerequisite: Stat 275. Recommended: a course in matrix theory. (Spring)

Gastwirth

279 **Methods in Economic Statistics** (3)

Applications of statistical methods to economics. Curve-fitting, regression, analysis of variance and chi-square techniques used to analyze economic data. Prerequisite: a year course in Statistics.

Shumway

281–82 **Time Series Analysis** (3–3)

Stationary and nonstationary time series, auto- and cross-correlation, power spectral analysis, multivariate normal processes, mean square estimation and regression, statistical inference, applications. Prerequisite: Stat 189–90; and 201–2 or 257–58. (Academic year)

Staff

283 **Advanced Statistical Laboratory** (3)

Application of the University computer to complex statistical problems on an individual study basis. Admission by permission of instructor. Laboratory fee, $25. May be repeated for credit only with permission of the Department. (Fall and spring)

Staff

285–86 **Seminar** (3–3)

Admission by permission of instructor. (Stat 285 and 286—fall and spring)

* An interdepartmental course offered by departments of Statistics and Economics.

295 **Reading and Research** (3) Staff
May be repeated once for credit. (Fall or spring)

296 **Seminar: Data Analysis Methods** (3) Staff
Case studies, data analysis procedures, and problems that a consultant might encounter.

297 **Problems in Mathematical Statistics** (3) Staff

298 **Seminar: Combinatorial Probability** (3) Staff

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

*378 **Seminar: Topics in Econometrics** (3) Staff
Limited to graduate students, primarily for doctoral students, offered as demand requires. A research seminar covering current econometric literature and special topics. Admission by permission of instructor.

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Urban and Regional Planning

Professor D.C. McGrath, Jr. (*Chairman*)
Professorial Lecturer Norman Beckman
Associate Professors Sherwin Greene, S.S. Fuller
Associate Professorial Lecturers S.J. Bellomo, R.E. Bonz

A program leading to the degree of *Master of Urban and Regional Planning*, which provides preparation for professional practice in the planning field, and areas of specialization in planning as components of programs leading to the degrees of Master of Arts in *Government*, *Master of Public Administration*, *Doctor of Business Administration*, and *Doctor of Public Administration*, are offered by the School of Government and Business Administration (see pages 131–61).

SECOND GROUP

153 **Principles of Urban Planning and Design** (3) Staff
Studio course for undergraduates. Basic elements of urban planning and design applied to community problems. Survey of planner's role in developing and implementing creative solutions to urban problems. (Spring)

* interdepartmental course offered by departments of Statistics and Economics.

THIRD GROUP

201 **Introduction to Urban Planning** (3) McGrath, Fuller
Introduction to history, concepts, and activities of urban planning. Discussion of trends in urbanism and the influences of technical and social change. (Fall and spring)

203 **Fundamentals of Urban Design** (4) Greene
Planning and design studio to develop and apply planning methods and graphic techniques, principles of land use and urban design; analysis of factors affecting community development and change. Open only to candidates for the degree of Master of Urban and Regional Planning. (Fall)

204 **Urban Development Planning** (4) Greene
Planning and design studio: investigation of social, environmental, and technological factors in planning. Application of comprehensive planning process to typical problems of community growth and development. Prerequisite: U&RP 203 or permission of instructor. Laboratory fee, $10. (Spring)

205 **Urban Housing** (3) Fuller
Examination of the housing problem: housing market characteristics, analytical techniques, national needs, costs, financing, federal programs, technology, rehabilitation, and policy formulation. Prerequisite: U&RP 201. (Fall and spring)

206 **Community Facilities Planning** (3) Fuller
Planning implications of essential public facilities which comprise community infrastructure. Emphasis on developing an understanding of the special design, service, and locational requirements of each class of community facility, the relationships among facilities, and their effects on urban development and the community at large. Prerequisite: U&RP 201 or permission of instructor. (Fall)

207 **Land Development Planning** (3) (Same as Law 571) McGrath
Selected problems in urban and regional planning: applications of zoning, urban renewal, and special programs available for the implementation of development plans. Prerequisite: U&RP 201 or permission of instructor. (Spring)

208 **Urban Transportation Planning** (3) Bellomo
Relationships between land use and the movement of goods and people in urban areas. Transportation planning principles, policy problems, methods for analyzing demand and systems for urban travel; roles of public agencies and private interests in the planning and development of various modes. Prerequisite: Mgt 204, U&RP 201. (Fall)

209 **Urban Transportation Models** (3) Sh
Consideration of land use activity, trip generation and distribution, mode choice models, traffic assignment, and decision-making techniques. Review of detail studies, calibration, interactions, applications, and accuracy limitations of various mathematical models. Prerequisite: U&RP 208 or permission of instructor.

210 **Urban Development Economics** (3) Bonz

Economic forces affecting urban growth and change; relationships among cities, metropolitan areas, and regions in the context of the national economy; socioeconomic implications of urban land development policies; basic studies and methods of economic analysis. Prerequisite: Econ 217–18 or equivalent; U&RP 201. (Spring)

215 **Advanced Planning Problems** (4) McGrath and Staff

Investigation of complex problems of the metropolitan region, analysis of findings, formulation of proposals, and presentation of material to faculty and cooperating groups. Multidisciplinary team and individual planning projects. Studio course. Prerequisite: U&RP 204. Laboratory fee, $10. (Fall)

218 **Metropolitan and Regional Planning** (3) Fuller and Staff

Multidisciplinary study of the methods of regional analysis and process of regional planning; development of projects of regional scale requiring problem analysis, synthesis, and plan formulation. Studio course. Prerequisite: U&RP 204 or permission of instructor. Laboratory fee, $10. (Spring)

221 **Land Development Law** (3) (Same as Law 501)

For description of the course, see the *National Law Center* catalogue. (Fall)

240 **Federal and State Urban Policy Development** (3) Beckman

Investigation of contemporary trends in the evolution of federal and state governmental functions and programs affecting urban growth and development policy. Planning function in the evolving relationships among units of federal, state, and metropolitan agencies. (Fall)

295 **Urban Research** (3) Staff

Directed research and investigation of special problems in community development. May be repeated once for credit. (Fall and spring)

299 **Thesis Seminar** (3) Staff

Examination of thesis standards, research philosophy and methodology. (Fall and spring)

300 **Thesis Research** (3) Staff

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Business Administration or Doctor of Public Administration general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Business Administration or Doctor of Public Administration candidates. May be repeated for credit. (Fall and spring)

Women Studies—Graduate Study

COMMITTEE ON WOMEN STUDIES

Ruth H. Osborn (*Coordinator*), Jessie Bernard, Thelma Hunt, Thelma Z. Lavine, W.F.E. Long, Lois Schwoerer, Suzanne Simons, Elizabeth Tidball

The Graduate School of Arts and Sciences offers an interdisciplinary program leading to the degree of Master of Arts in Special Studies with a concentration in Women Studies, directed by the Committee on Women Studies. Each student will work closely with the Committee in designing a program to meet individual interests, goals, and background knowledge. Prospective candidates should consult with the Coordinator of the Committee for specific requirements.

Master of Arts in Special Studies (Women Studies).—Prerequisite: a Bachelor's degree from an accredited college or university. Students are expected to have completed the prerequisites to graduate courses.

Required: the general requirements, pages 92–99. The program of study consists of 36 semester hours with or without a thesis, including a plurality of approved courses in the Arts and Sciences with no more than one-third from any one department. W St 220 and 221 are required courses for all students; W St 283 and 295 are required for students *not electing* a thesis; W St 299–300 is required for those *electing* a thesis. In addition course work may be selected from the School of Education, School of Government and Business Administration, and National Law Center. All candidates are required to pass a Master's Comprehensive Examination. There is no tool requirement.

THIRD GROUP

220 **Selected Topics on Women** (3) Staff

Research and theory from the following: anthropology, economics, history, literature, philosophy, physiology, psychology, and sociology. (Fall and spring)

221 **Seminar: Women in Perspective** (3) Staff

Past, present, and future roles of women based on interdisciplinary study. Prerequisite: W St 220. (Fall and spring)

283 **Practicum in Women Studies** (3) Staff

Field experience in agencies engaged in counseling, instruction, or supervision of women, and in related research.

295 **Independent Research in Women Studies** (arr.) Staff

Supervised independent research. Students will be expected to contribute to the present body of knowledge in the historical, literary, or statistical study of women.

299–300 **Thesis Research** (3–3)

Zoology

See "Biological Sciences."

FACULTY AND STAFF OF INSTRUCTION

COLUMBIAN COLLEGE OF ARTS AND SCIENCES

GRADUATE SCHOOL OF ARTS AND SCIENCES

SCHOOL OF EDUCATION

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS

EMERITI

Caroline Lander Adams, *Professor Emeritus of Botany*
B.A. 1925, Illinois College; M.S. 1928, University of Chicago; Ph.D. 1932, University of Wisconsin, Madison

Errett Cyril Albritton, *Professor Emeritus of Physiology*
B.A. 1916, University of Missouri, Columbia; M.D. 1921, Johns Hopkins University

Ruth Harriet Atwell, *Professor Emeritus of Physical Education for Women*
Ph.B. 1918, Denison University; M.A. in Ed. 1933, George Washington University

Gretchen Rogers Bolwell, *Professor Emeritus of German*
B.A. 1930, M.A. 1931, George Washington University; Ph.D. 1938, Johns Hopkins University

Robert Whitney Bolwell, *Professor Emeritus of American Literature*
B.A. 1916, Case Western Reserve University; M.A. 1917, Ph.D. 1921, Columbia University; Litt.D. 1957, George Washington University

Paul William Bowman, *Professor Emeritus of Biology*
B.A. 1924, University of Pennsylvania; M.A. 1928, George Washington University; Ph.D. 1930, University of Virginia

John Withrow Brewer, *Professor Emeritus of Political Science and International Law*
B.A. 1926, M.A. 1930, Ph.D. 1932, Princeton University

Elizabeth Burtner, *Professor Emeritus of Physical Education*
B.A. 1927, Hood College; M.A. 1935, Columbia University

Paul Calabrisi, *Professor Emeritus of Anatomy*
B.A. 1931, Catholic University of America; M.A. 1940, George Washington University; Ph.D. (Cantab.) 1955, University of Cambridge, England

Richard Bernard Castell, *Director Emeritus of the Student Health Service*
B.A. 1932, M.D. 1935, George Washington University

Elbridge Colby, *Professor Emeritus of Journalism*
B.A. 1912, M.A. 1913, Ph.D. 1922, Columbia University

Oswald Symister Colclough, *Professor Emeritus of Law; Dean of Faculties Emeritus; Emeritus Director of the Patent, Trademark, and Copyright Research Institute*
B.S. 1920, U.S. Naval Academy; LL.B. 1935, Sc.D. 1961, George Washington University; LL.D. 1946, Muhlenberg College

George Frederick Conner, *Associate Professor Emeritus of Business Administration*
B.S. 1929, U.S. Military Academy; M.B.A. 1938, Harvard University

Alan Thomas Deibert, *Professor Emeritus of Romance Languages*
B.A. 1918, Gettysburg College; M.A. 1922, Harvard University

William Webster Diehl, *Professor Emeritus of Mycology*
B.A. 1914, Miami University; M.S. 1915, Iowa State University of Science and Technology; Ph.D. 1932, Harvard University

William Rankin Duryee, *Research Professor Emeritus of Pathology (Experimental)*
B.S. 1927, Ph.D. 1933, Yale University

Frederick Harrell Gibbs, *Professor Emeritus of Health Care Administration*
B.S. 1958, University of Maryland; M.H.A. 1959, University of Minnesota, Minneapolis-St. Paul

Wood Gray, *Professor Emeritus of American History*
B.A. 1927, M.A. 1928, University of Illinois; Ph.D. 1933, University of Chicago

Ira Bowers Hansen, *Professor Emeritus of Zoology*
B.S. 1928, M.A. 1929, Wesleyan University; Ph.D. 1932, University of Chicago

Thomas Willard Holland, *Professor Emeritus of Labor Economics*
B.A. 1923, University of Michigan; LL.B. 1934, Columbia University; Ph.D. 1939, University of Wisconsin, Madison

Averett Howard, *Professor Emeritus of English Composition*
B.A. 1922, University of California, Berkeley; M.A. 1940, Cornell University

Thelma Hunt, *Professor Emeritus of Psychology, in Residence*
B.A. 1924, M.A. 1925, Ph.D. 1927, M.D. 1935, George Washington University

Herbert Jehle, *Professor Emeritus of Physics*
Dr.Ing. 1933, Institute of Technology, Berlin

Everett Herschel Johnson, *Professor Emeritus of Statistics*
B.A. 1926, DePauw University; M.A. 1929, Lehigh University; Ph.D. 1942, University of Michigan

Francis Edgar Johnston, *Professor Emeritus of Mathematics*
B.A. 1921, George Washington University; M.A. 1923, Ph.D. 1926, University of Illinois

Elmer Louis Kayser, *Professor Emeritus of European History; Dean Emeritus of the Division of University Students*
B.A. 1917, M.A. 1918, LL.D. 1948, George Washington University; Ph.D. 1932, Columbia University

Frances Kirkpatrick, *Professor Emeritus of Home Economics*
B.S. 1919, University of Missouri, Columbia; M.A. 1929, Columbia University

Donald Chenoweth Kline, *Professor Emeritus of Art, in Residence*
B.Arch. 1927, George Washington University; M.F.A. 1951, Catholic University of America

Wolfgang Herbert Kraus, *Professor Emeritus of Political Science and International Affairs*
Dr.Jur. 1929, University of Frankfurt, Germany; S.J.D. 1931, Harvard University

Solomon Kullback, *Professor Emeritus of Statistics, in Residence*
B.S. 1927, City University of New York, City College; M.A. 1929, Columbia University; Ph.D. 1934, George Washington University

John Francis Latimer, *Professor Emeritus of Classics*
B.A. 1922, Litt.D. 1964, Mississippi College; M.A. 1926, University of Chicago; Ph.D. 1929, Yale University

Helen Bennett Lawrence, *Professor Emeritus of Physical Education for Women*
B.S. in P.E. 1934, M.A. 1938, George Washington University

Chester Elwood Leese, *Professor Emeritus of Physiology*
B.A. 1922, M.A. 1925, Ph.D. 1930, University of Iowa

Wolfram Karl Legner, *Professor Emeritus of German*
B.A. 1923, Harvard University; M.A. 1932, Ph.D. 1936, University of Pennsylvania

Kurt London, *Professor Emeritus of International Affairs*
Ph.D. 1923, University of Würzburg, Germany

John Russell Mason, *Librarian Emeritus; Curator of Art Emeritus*
B.A. 1923, M.A. 1925, George Washington University; M.S. in L.S. 1933, Columbia University

Florence Marie Mears, *Professor Emeritus of Mathematics*
B.A. 1917, Goucher College; M.A. 1924, Ph.D. 1927, Cornell University

Howard Maxwell Merriman, *Professor Emeritus of American Diplomatic History*
B.A. 1930, M.A. 1931, University of Cincinnati; M.A. 1932, Ph.D. 1937, Harvard University

Edith Elizabeth Mortensen, *Professor Emeritus of Zoology*
B.A. 1925, Carleton College; M.A. 1927, University of Minnesota, Minneapolis-St. Paul; Ph.D. 1945, George Washington University

Sam Clark Munson, *Professor Emeritus of Biology*
B.S. 1930, M.S. 1931, Mississippi State University; Ph.D. 1952, University of Maryland

William Henry Myers, *Professor Emeritus of Physical Education, Health, and Recreation for Men*
B.A. 1931, Occidental College; M.A. in Ed. 1941, George Washington University

Richard Norman Owens, *Professor Emeritus of Business Administration*
B.A., B.S. 1917, University of Missouri, Columbia; M.A. 1922, Ph.D. 1928, University of Chicago; C.P.A. 1923, State of Illinois

Leland Wilbur Parr, *Professor Emeritus of Bacteriology*
B.S. 1916, Ph.D. 1923, University of Chicago

Lois Irene Platt, *Associate Professor Emeritus of Pathology*
B.A. 1931, Goucher College; M.D. 1946, University of Maryland

Blake Smith Root, *Professor Emeritus of Education*
B.S. 1927, Monmouth College, Illinois; M.A. 1931, University of Illinois; Ed.D. 1948, George Washington University

Myrna Pauline Sedgwick, *Administrative Secretary Emeritus*
B.A. 1911, Wellesley College

Edward Henry Sehrt, *Professor Emeritus of German*
B.A. 1911, Ph.D. 1915, Johns Hopkins University

Ernest Sewall Shepard, *Professor Emeritus of English Literature*
B.A. 1925, M.A. 1927, George Washington University

Waldo Sommers, *Professor Emeritus of Public Administration, in Residence*
B.A. 1927, Heidelberg College; M.A. 1934, Ph.D. 1948, Yale University

Karl Ernest Stromsem, *Professor Emeritus of Public Administration*
B.A. 1930, Pomona College; Ph.D. 1935, University of California, Berkeley

Harold Griffith Sutton, *Director of Admissions Emeritus*
B.A. 1918, Ohio State University; M.S. 1921, Columbia University

Ira Rockwood Telford, *Professor Emeritus of Anatomy*
B.A. 1931, M.A. 1933, University of Utah; Ph.D. 1942, George Washington University

Kathryn Mildred Towne, *Professor Emeritus of Home Economics*
B.S. 1923, Montana State University; M.A. 1930, Columbia University

Donald Stevenson Watson, *Professor Emeritus of Economics*
B.A. 1930, University of British Columbia; Ph.D. 1935, University of California, Berkeley

Frank Mark Weida, *Professor Emeritus of Statistics*
B.S. 1913, Kenyon College; Ph.D. 1923, University of Iowa

Warren Reed West, *Professor Emeritus of Political Science*
B.A. 1918, George Washington University; Ph.D. 1922, Johns Hopkins University

Ralph Kirby White, *Professor Emeritus of Social Psychology, in Residence*
B.A. 1929, Wesleyan University; Ph.D. 1937, Stanford University

Samuel Nathaniel Wrenn, *Professor Emeritus of Chemistry*
B.A. 1927, M.A. 1929, Duke University; Ph.D. 1935, Pennsylvania State University

Lawson Edwin Yocum, *Professor Emeritus of Botany*
B.S. 1916, Pennsylvania State University; M.S. 1920, Ph.D. 1924, State College of Iowa

Donnell Brooks Young, *Professor Emeritus of Zoology*
B.S. 1911, Amherst College; Ph.D. 1923, Columbia University

ACTIVE*

Fred Paul Abramson, *Assistant Research Professor of Pathology and of Pharmacology*
B.A. 1962, Case Western Reserve University; Ph.D. 1965, Ohio State University

* The University Faculty is composed of the President of the University, the Vice President for Academic Affairs, the Director of Admissions, the Registrar, the University Librarian, the Treasurer, the Director of the Student Health Service, the Administrator for Clinical Affairs, and the membership of the several college and school faculties.

* Eugene Abravanel, *Associate Professor of Psychology*
B.A. 1955, University of Michigan; M.A. 1960, Swarthmore College; Ph.D. 1965, University of California, Berkeley

Alice Anderson Adams, *Assistant Clinical Professor of Psychology*
B.F.A. 1948, Ph.D. 1959, University of Oklahoma

Elizabeth Byrne Adams, *Assistant Professor of Management*
B.S. 1955, City University of New York, Queens College; M.A. in Ed. 1957, George Washington University

Lewis Francis Affronti, *Professor of Microbiology*
B.A. 1950, M.A. 1951, State University of New York at Buffalo; Ph.D. 1958, Duke University

Ernest Narinder Albert, *Associate Professor of Anatomy*
B.S. 1959, High Point College; M.S. 1963, University of Pittsburgh; Ph.D. 1965, Georgetown University

Yousef Al-Doory, *Assistant Professor of Epidemiology and Environmental Health*
B.S. 1945, University of Baghdad, Iraq; M.A. 1951, University of Texas at Austin; Ph.D. 1954, Louisiana State University, Baton Rouge

Charles Edward Alexander Jr., *Associate Professorial Lecturer in Epidemiology and Environmental Health*
B.A. 1951, Yale University; M.D. 1955, University of Pennsylvania; M.P.H. 1959, D.P.H. 1964, Johns Hopkins University

Frank Duane Allan, *Professor of Anatomy*
B.S. 1947, M.S. 1949, University of Utah; Ph.D. 1954, Louisiana State University, Baton Rouge

John Gage Allee, Jr., *Professor of English; Dean of the Division of University Students*
B.A. 1939, M.A. 1940, George Washington University; Ph.D. 1955, Johns Hopkins University

David Seth Alterman, *Assistant Professorial Lecturer in Sociology*
B.S. 1970, University of Pennsylvania; M.A. 1972, American University

Frederick Amling, *Professor of Business Finance*
B.A. 1948, Baldwin-Wallace College; M.B.A. 1949, Miami University; Ph.D. 1957, University of Pennsylvania

W. French Anderson, *Professorial Lecturer in Biochemistry (Genetics)*
B.A. 1958, M.D. 1963, Harvard University; M.A. 1960, University of Cambridge, England

Avery Delano Andrews II, *Assistant Professor of History*
B.A. 1950, Harvard University; LL.B. 1953, M.A. 1958, Ph.D. 1962, University of Pennsylvania

Grover LaMarr Angel, *Professor of Education*
B.A. 1929, High Point College; M.A. in Ed. 1946, Ed.D. 1952, George Washington University

John Lawrence Angel, *Professorial Lecturer in Anatomy and Anthropology*
B.A. 1936, Ph.D. 1942, Harvard University

Tatiana Antonovych, *Professorial Lecturer in Pathology*
M.D. 1941, University of Vienna, Austria

Daniel Appleman, *Professorial Lecturer in Geology*
B.S. 1953, California Institute of Technology; M.A. 1954, Ph.D. 1956, Johns Hopkins University

Fairlie Arant, *Assistant Professorial Lecturer in Speech*
B.A. 1957, Wellesley College; M.A. 1961, Columbia University; Ph.D. 1971, University of Minnesota, Minneapolis-St. Paul

Philip Elwyn Arsenault, *Associate Professorial Lecturer in Education*
B.A. 1935, M.S. in Ed. 1937, Clark University; Ph.D. 1958, Princeton University

Joseph Aschheim, *Professor of Economics*
B.A. 1951, University of California, Berkeley; M.A. 1953, Ph.D. 1954, Harvard University

David Lynn Atkins, *Assistant Professor of Biology*
B.A. 1957, University of Texas at Austin; M.A. 1963, East Texas State University; Ph.D. 1970, Texas A&M University

Neil Patterson Atkins, *Professorial Lecturer in Education*
B.A. 1947, Middlebury College; M.A.T. 1948, Harvard University; Ed.D. 1961, Columbia University

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* On sabbatical leave 1973-74.

Ines Azar, *Assistant Professor of Spanish*
M.A. 1969, Johns Hopkins University

Joseph Baclawski, *Professorial Lecturer in International Affairs*
B.A. 1947, M.A. 1948, Ph.D. 1951, University of Michigan

Catherine McGraw Bahl, *Lecturer in English*
B.A. 1968, Trinity College, District of Columbia

John Martyn Bailey, *Professor of Biochemistry*
B.S. 1949, Ph.D. 1952, D.Sc. 1970, University of Wales

Robert Edward Baker, *Professor of Education; Assistant Dean of the School of Education*
B.S. in Ed. 1939, State University of New York at Buffalo; M.A. 1954, Catholic University of America; M.A. in Ed. 1956, Ed.D. 1962, George Washington University

Samuel Harvard Barboo, Jr., *Assistant Professorial Lecturer in Epidemiology and Environmental Health*
B.S. 1955, M.P.H. 1957, University of California, Berkeley; D.P.H. 1966, University of California, Los Angeles

Ruth Lillian Aaronson Bari, *Associate Professor of Mathematics*
B.A. 1939, City University of New York, Brooklyn College; M.A. 1943, Ph.D. 1966, Johns Hopkins University

Shirley Russell Barnett, *Assistant Professor of Spanish*
B.A. 1944, Vassar College; M.A. 1946, Vanderbilt University; Ph.D. 1958, University of Minnesota, Minneapolis-St. Paul

Richard Adrian Barrett, *Associate Professor of Business Administration; Director, Navy Graduate Financial Management Program*
B.A. 1930, Amherst College; M.B.A. 1932, Harvard University; D.B.A. 1972, George Washington University

Miriam Marsh Barteaux, *Instructor in Special Education*
B.A. 1947, Colby College; M.S. 1949, University of Maine at Orono

James Richard Barth, *Assistant Professor of Economics*
B.A. 1965, Sacramento State College; M.A. 1967, University of New Mexico; Ph.D. 1972, Ohio State University

Bette Lee Barton, *Associate Professor of Chemistry*
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APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subject to change in connection with the establishment of judicial processes. Bulletins and handbooks incorporating any changes will be issued as appropriate.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on October 19, 1968:

Whereas, safety and order are essential preconditions of the learning process, and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection of free speech and freedom of assembly, and to safeguarding the right of lawful protest on campus; and is committed equally to maintaining the peace and safety of the campus, in the knowledge that all rights are in jeopardy when violence and civil disorder prevail over law and reason;

Now, therefore, be it resolved by the Senate of The George Washington University: that in the event a demonstration at this University exceeds the bounds of free assembly and lawful advocacy, and demonstrators are engaging in unlawful acts which cause or imminently threaten injury to persons or property, or which obstruct or interfere with normal and necessary University activities, this body affirms the authority of the President, or other University officials designated to act in his absence, to take such reasonable steps, if possible after consultation with the Chairman of the Executive Committee of the University Senate* and the President of the Student Body, as are required to restore and preserve order; including, if deemed necessary and appropriate, suspension of students or faculty engaging in such acts, and use of such law enforcement personnel as are needed to effect the removal, arrest, and prosecution of law violators. Any such suspension shall be reviewed by an appropriate tribunal as soon after order is restored as is practicably possible.

The following was approved by the University's Board of Trustees on October 19, 1968:

Any student suspended from The George Washington University on the grounds of exceeding the bounds of free assembly and lawful advocacy shall have his suspension reviewed by the Hearing Committee on Student Affairs†

* The University Senate has been renamed the Faculty Senate.
† The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

of The George Washington University as soon after order is restored as is practicably possible.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968:

The George Washington University is opposed to discrimination based on race, color, or creed. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the Faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

(a) who engages in conduct that unreasonably obstructs teaching, research and learning, or

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or
(c) who disobeys general regulations of the University, or
(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established within the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*

* The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

ANNUAL ISSUES OF THE UNIVERSITY BULLETIN

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SCHEDULE OF CLASSES: SUMMER SESSIONS, Dean of the Summer Sessions

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COLUMBIAN COLLEGE OF ARTS AND SCIENCES: Associate in Arts (A.A.), Associate in Arts in General Studies (A.A. in Gen.Std.), Bachelor of Arts (B.A.), Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bachelor of Science in Environmental Health (B.S. in Env.Health), Bachelor of Science in Geodetic and Cartographic Science (B.S. in Geod. and Cart.Sc.), Bachelor of Science in Medical Technology (B.S. in Med.Tech.), and Bachelor of Science in Oceanography (B.S. in Ocea.)

GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master of Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.), Master of Music (Mus.M.), Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers), Master of Science in Forensic Science (M.S. in Forens.S.), Master of Science in Special Studies (M.S. in Sp.Std.), and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE: Associate in Science (A.S.), Bachelor of Science in Allied Health Science (B.S. in A.H.S.), Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master of Comparative Law (M.Comp.L.), Master of Comparative Law (American Practice) (M.Comp.L. (Am.Prac.)), and Doctor of Juridical Science (S.J.D.)

SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil Engineering) (B.S. (C.E.)), Bachelor of Science (Electrical Engineering) (B.S. (E.E.)), Bachelor of Science (Mechanical Engineering) (B.S. (M.E.)), Master of Engineering Administration (M.E.A.), Master of Science (M.S.), and Doctor of Science (D.Sc.)

SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed.), Bachelor of Science in Physical Education (B.S. in P.E.), Master of Arts in Education (M.A. in Ed.), Master of Arts in Teaching (M.A.T.), Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Business Administration (B.B.A.), Bachelor of Science in Administration (B.S. in Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.), Master of Arts in Government (M.A. in Govt.), Master of Arts in Health Care Administration (M.A. in H.C.A.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), Master of Science in Administration (M.S. in Adm.), Master of Urban and Regional Planning (M. of Urb. and Reg.Plan.), Post-Master's Graduate Certificate in Health Care Administration (Grad.Cert. in H.C.A.), Doctor of Business Administration (D.B.A.), and Doctor of Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.), Master of Arts (M.A.), and Master of Science in International Affairs (M.S. in I.A.)

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THE GEORGE WASHINGTON UNIVERSITY

COLUMBIAN COLLEGE OF ARTS AND SCIENCES, 1821

THE GRADUATE SCHOOL OF ARTS AND SCIENCES, 1893

THE SCHOOL OF MEDICINE, 1825

THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, 1928

THE COLLEGE OF GENERAL STUDIES, 1950

THE DIVISION OF UNIVERSITY STUDENTS, 1930

THE SUMMER SESSIONS, 1916

THE UNIVERSITY HOSPITAL, 1898

THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, D.C. 20006

THE GEORGE WASHINGTON UNIVERSITY BULLETIN

SCHOOL OF MEDICINE

1973-1974

THE GEORGE WASHINGTON UNIVERSITY BULLETIN
Volume LXXII, Number 2, December, 1972

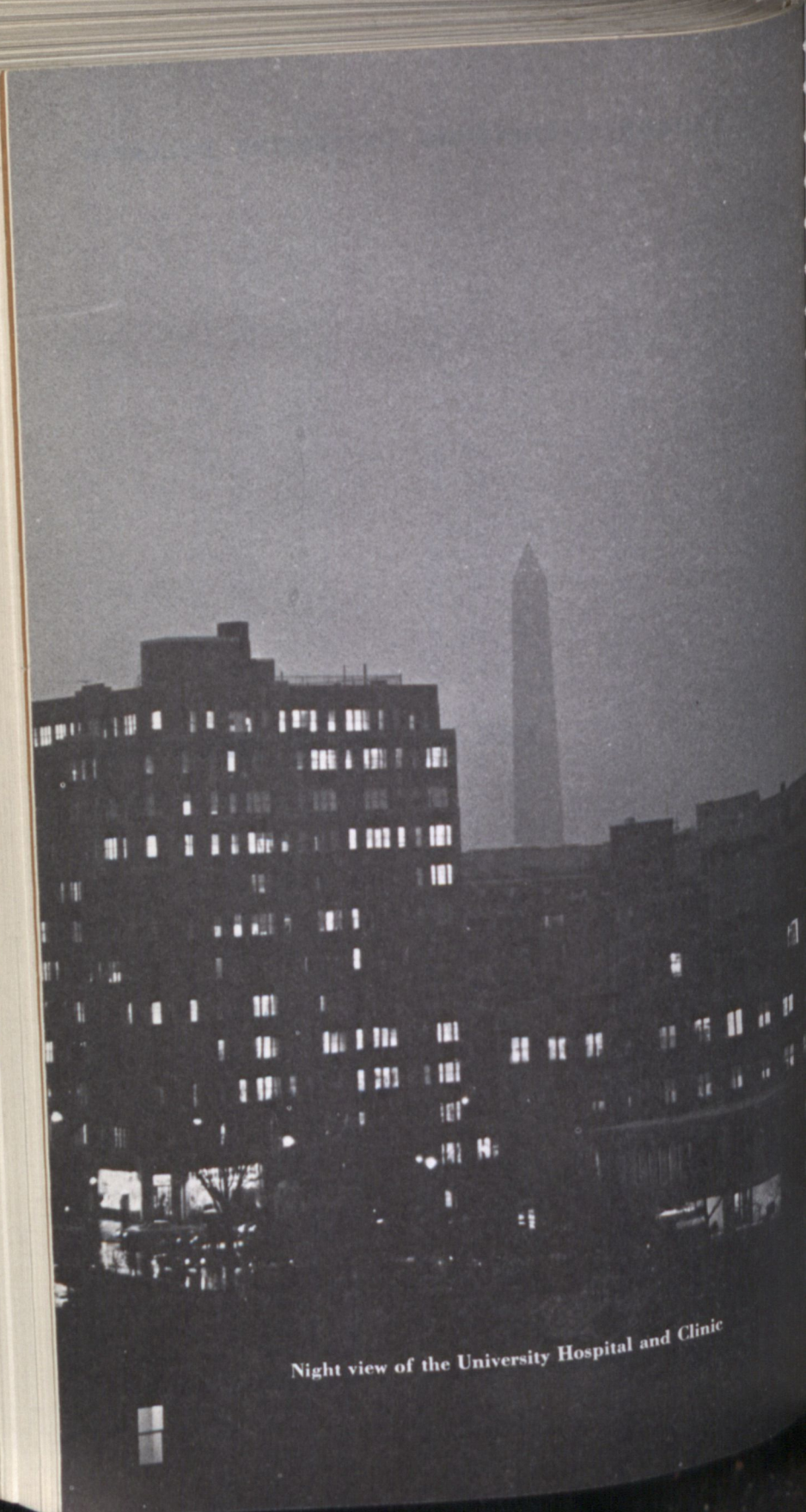
Published by The University at Washington, D. C. 20006
MONTHLY: JANUARY, MAY, JUNE, JULY
(2 ISSUES IN DECEMBER, FEBRUARY, APRIL)

Second Class Postage Paid at Washington, D. C.

THE GEORGE WASHINGTON UNIVERSITY BULLETIN

THE SCHOOL OF MEDICINE
1973–1974

WASHINGTON, D.C. 20005



Night view of the University Hospital and Clinic

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1974

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1973–74 FALL SEMESTER

September 5 Registration *Wednesday*

September 6 Orientation for 1st-year students *Thursday*

September 7 Opening Assembly *Friday*

September 10 Classes begin *Monday*

November 21 Thanksgiving recess begins after last class *Wednesday*

November 26 Classes resume *Monday*

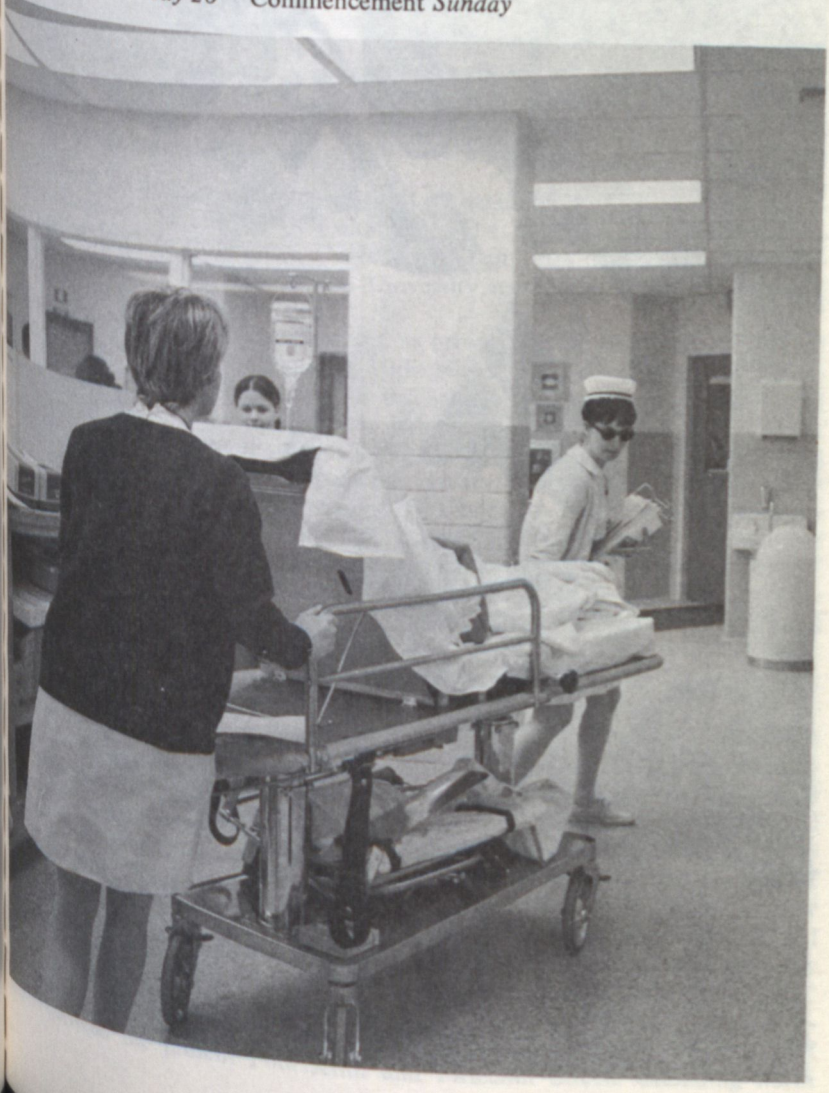
December 15 Christmas recess begins after last class *Saturday*

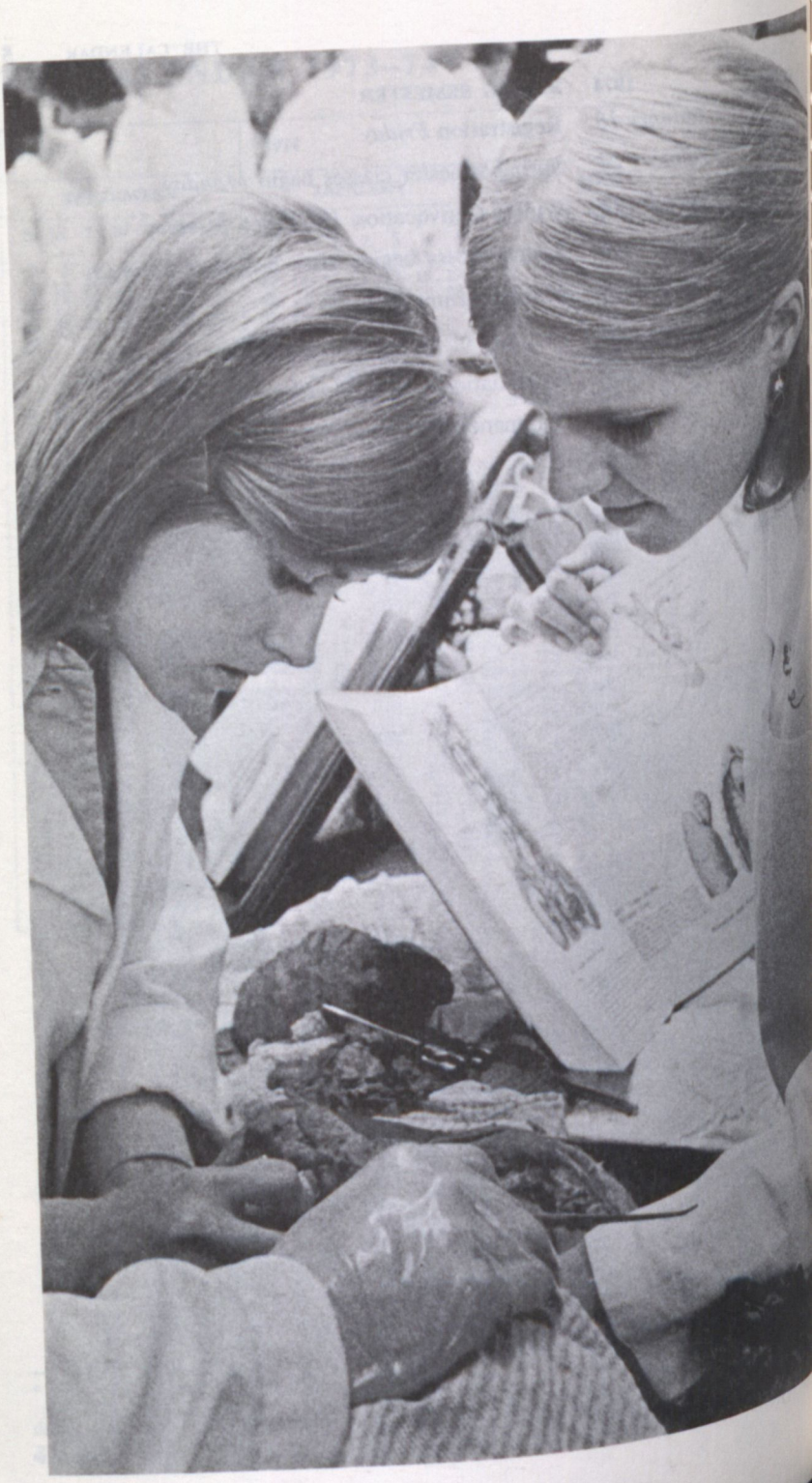
January 2 Classes resume *Wednesday*

January 14–18 Examination period *Monday–Friday*

* This Calendar is tentative and subject to revision.
The examination schedule, recesses, and semester breaks do not apply to 3rd- and 4th-year students. See the *School of Medicine Schedule of Classes.*

1974	**SPRING SEMESTER**
January 18	Registration *Friday*
January 21	Spring-semester classes begin *Monday*
February 18	Winter Convocation (holiday) *Monday*
March 9	Spring recess begins after last class *Saturday*
March 18	Classes resume *Monday*
May 18	Last day of spring-semester classes *Saturday*
May 20–25	Examination period *Monday–Saturday*
May 26	Commencement *Sunday*





THE UNIVERSITY

HISTORY AND ORGANIZATION

THE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington, whose name it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the Federal City. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended "a fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "That persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets extending north

from Florida Avenue somewhat beyond Columbia Road. The Medical School was located downtown. For the better part of the Columbian University period, the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. Within a few squares are the White House, the Department of the Interior, the State Department, the World Bank, and many other governmental offices and international agencies. The area is not without its reminders of historic interest to the University. President Monroe, who signed the Charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for fifty years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he had hoped to see established.

The University as it is now organized consists of Columbian College of Arts and Sciences (undergraduate); the Graduate School of Arts and Sciences; the professional schools, which include the National Law Center and the schools of Medicine, Engineering and Applied Science, Education, Government and Business Administration, and Public and International Affairs; the College of General Studies; the Division of University Students; and the Summer Sessions.

The George Washington University is privately endowed and is governed by a self-perpetuating Board of Trustees of which the president is an ex officio member.

ACADEMIC STATUS

The George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools. The University is on the approved list of the American Association of University Women and is a member of the College Entrance Examination Board. The Department of Chemistry is on the approved list of the American Chemical Society.

The School of Medicine has had continuous approval by the Council on Medical Education of the American Medical Association and the Association of American Medical Colleges. The Doctor of Medicine degree of the School of Medicine is recognized by all state and territorial medical licensure boards in the United States.

CLOYD HECK MARVIN CENTER

The Cloyd Heck Marvin Center serves as the campus community center, providing services, conveniences, and recreational and social opportunities for students, faculty, staff, alumni, and guests. Its wide range of facilities provides the setting for a variety of programs conducted by the University Program Board; the departments of Drama, Dance, and Music; and other student and faculty organizations.

A two-board structure, representative of all elements of the University community, plays an important role in the day-to-day functioning of the Center. The Governing Board and the Operations Board work closely with the full-time staff in the development of procedures and policies which provide a framework for the Center's operation.

RECREATION

The Nation's capital provides abundant recreational resources, a large number of which are available at little or no cost. There are numerous art galleries, museums, concert halls, theaters, swimming pools, parks, and places of great historic interest. Social activities are provided by student organizations of the University, the School of Medicine, and University-sponsored programs such as intramural sports, concerts, recitals, and dramatic productions. Religious faiths are well represented in the Washington metropolitan area. Washington is one of the most colorful cultural and scientific centers of the world.

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THE SCHOOL OF MEDICINE

THE SCHOOL OF MEDICINE OF GEORGE WASHINGTON UNIVERSITY has a distinguished history that goes back more than a century. In March, 1825, the School opened with the intention of building "a medical school commensurate with the progress and demands of a rising metropolis, and the improvement of service throughout the country." The School of Medicine, the eleventh oldest in the country, has met this responsibility by providing its students with a foundation in the medical sciences upon which they have built medical careers in practice, teaching, research, or administration.

In 1844, the School took on a new dimension when Congress granted it the use of the Washington Infirmary. Thus one of the earliest general teaching hospitals in the Nation was established in Washington.

The distinguished history of the George Washington University School of Medicine closely parallels academic advances and medical progress of the Nation. The School has contributed to both.

The George Washington University Medical Center, established in 1966, consists of the School of Medicine, the University Hospital, the University Clinic, the Warwick Building, and affiliated hospitals.

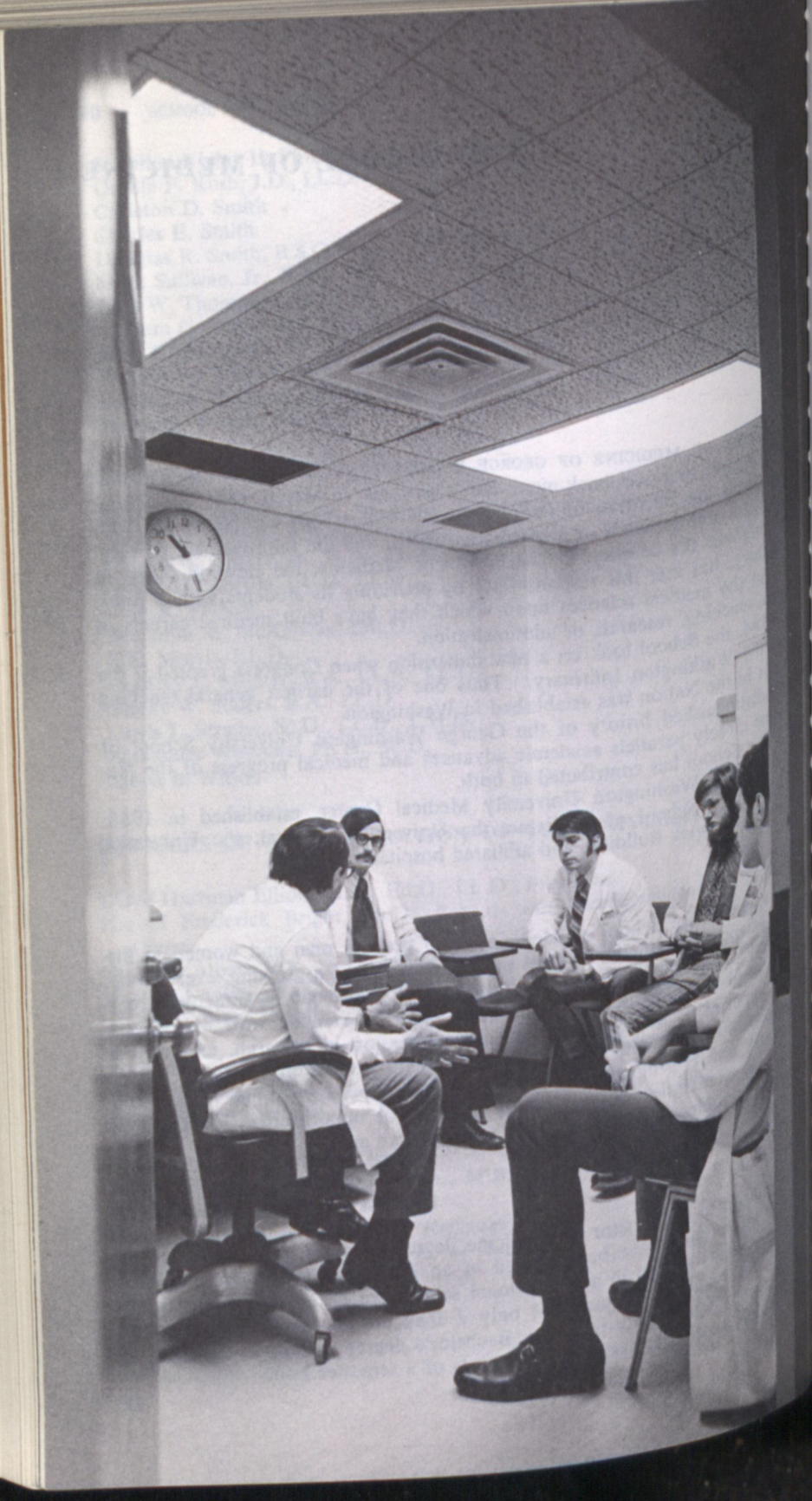
OBJECTIVES

The purpose of the School of Medicine is to prepare men and women in the art and science of medicine to meet the health needs of a growing, ever-changing society. It is the responsibility of the School to provide its students with a systematic plan of instruction in the basic medical sciences, with well-guided clinical experience, with opportunities for expression in research, and with a philosophy in keeping with the highest ethics of the profession.

To carry out its program, the School maintains a well qualified faculty and makes use of facilities which provide exceptional opportunities for research and clinical training in the Washington metropolitan area.

ENTRANCE REQUIREMENTS

For admission to the Doctor of Medicine degree program, a minimum of 90 semester hours must have been earned in an accredited institution of higher learning. Credits earned in a professional school can be applied to the fulfillment of this minimum requirement only if they are acceptable by the applicant's college or university toward a Bachelor's degree in Arts or Science. A credit under the quarter system is two-thirds of a semester hour.



It is advantageous to complete four full years of undergraduate work. Only exceptional students are accepted upon completion of the minimal requirements.

The following courses must be completed with satisfactory achievement before the applicant can be certified for matriculation. All required science courses must include sufficient laboratory work to give assurance of familiarity with the experimental methods and techniques of the disciplines.

1. **Biology:** 8 semester hours, including 4 hours of laboratory. This may be either in general biology or zoology but may *not* include separately credited courses in botany.
2. **Chemistry:** 8 semester hours of general inorganic chemistry (which may include qualitative analysis), including 4 semester hours of laboratory; and 6 to 8 semester hours of organic chemistry, including laboratory.
3. **Physics:** 8 semester hours, including at least 2 semester hours of laboratory.
4. **English:** 6 semester hours in composition and literature. This may be the usual introductory college course or its equivalent.

While not required for admission, courses in embryology, histology, genetics, and mathematics are strongly recommended.

ADMISSION PROCEDURE

All questions related to admissions, requests for applications, or the mailing of applications and credentials should be addressed to the Office of Admissions, School of Medicine, George Washington University, 1331 H Street, N.W., Washington, D.C. 20005.

The applicant should give careful attention to the entrance requirements, supplying all the information asked for on the application and furnishing the School with all the required credentials. An applicant cannot be considered until the following are received:

1. A fully completed *Application for Admission.*
2. Official transcripts of record from the registrar of *each* college, university, professional school, or other medical school attended—including summer sessions. Inclusion of transferred credits on a transcript will *not* serve in place of the transcript from the school where the credits were earned. Applicants currently in attendance should request official transcripts of record to date and send *supplemental transcripts* as soon as courses are completed and grades are recorded.
3. Letters of recommendation from the applicant's premedical advisory committee *or* from the references given in the application.
4. The results of the Medical College Admission Test, sponsored by the Association of American Medical Colleges. Information concerning this test may be obtained from premedical advisers or the Association of American Medical Colleges, Division of Educational Measurement and Research, One Dupont Circle, N.W., Washington, D.C. 20036.
5. A check or money order made out to George Washington University in the amount of $25 to cover the cost of evaluating credentials.

ADVANCED STANDING

The School of Medicine's curriculum is such that admission with advanced standing is ordinarily limited to the third year. Applicants for admission to the

second year will be considered in exceptional circumstances. The applicant for advanced standing must

1. Be or have been a regularly registered student in a school of medicine which is a member or an affiliate member of the Association of American Medical Colleges. Citizens of the United States in foreign medical schools, other than those in Canada, should participate in the COTRANS program sponsored by the Association of American Medical Colleges. Information on this program may be obtained from the Association at One Dupont Circle, N.W., Washington, D.C. 20036.

2. Be in good standing and eligible to continue in the school where he is currently enrolled, or eligible to re-enter that school if his education has been interrupted.

3. Have completed a course of study at least equivalent to that required for advancement to the year for which he is applying had he been a student in the George Washington University School of Medicine. For admission to the second year, he must have completed all work in anatomy, biochemistry, microbiology, and physiology; for admission to the third year, he must have finished all work in these subjects, as well as all work in pathology and pharmacology, and must have completed didactic courses in medicine, surgery, obstetrics and gynecology, pediatrics, and psychiatry.

4. Have the endorsement of the dean of his school of medicine or his authorized delegate.

5. Take the Part I Examination of the National Board of Medical Examiners if he is applying for admission to the third year. He should plan to take the examination in June of the year in which he wishes to enter. Citizens of the United States attending foreign medical schools, other than those in Canada, are required to pass all subjects of the Part I Examination in order to demonstrate competence in the basic sciences. For admission to the second year, citizens of the United States attending foreign medical schools, other than those in Canada, must pass the National Board Examinations in anatomy, biochemistry, microbiology, and physiology.

The application procedures are otherwise the same as those given under the general instructions for admission.

SELECTION PROCEDURES

The Committee on Admissions reviews credentials as soon as they are complete. The Committee is guided in the selection of students by the applicant's academic ability, the results of the Medical College Admission Test, and personal qualifications as determined by letters of reference and personal interview. Applicants are interviewed regionally or locally on invitation by the Committee. The applicant who is invited to an interview should make every effort to keep the appointment or let the School know promptly if another arrangement must be made. The interviewer's report is an essential part of the applicant's record. The Committee on Admissions will not make a final recommendation until it has been received. In the selection process, there is no discrimination because of sex, race, color, religion, or national origin.

Each applicant is notified of the Committee's decision as soon as possible.

An applicant who is offered a place in a class is required, within two weeks, to notify the Office of Admissions of the School of Medicine of his intent to

accept the place reserved for him. A deposit of $100 must be remitted within two weeks of the date of admission. This deposit will not be refunded after Registration. It will be credited toward the tuition for the first semester.

Accompanying the offer of a place in class will be forms for a report on physical condition. This report must be completed and returned to the Office of Admissions of the School of Medicine by the student's physician within two months of receipt of the letter of acceptance.

REGISTRATION

Registration for the 1973–74 fall semester will be conducted from 10 a.m. to 2 p.m., on September 5. The place of registration for the fall semester as well as the time and place of registration for the spring semester and the summer session of fourth-year clerkships will be announced in the *Schedule of Classes.*

FEES AND FINANCIAL REGULATIONS

The following fees have been established for the academic year 1973–74. (See page 16 for projected tuition increases for 1974–78.)

Application fee	$25.00
Tuition fee, for the academic year	3,000.00
University Center fee, charged all students (except those granted "leave of absence" status) each semester	37.50
Late registration fee, for failure to register within the designated period	15.00
Late payment fee, charged for failure to make payments when due (see "Payment of Fees," below)	15.00
Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," below)	35.00
Continuous Registration fee, charged each student granted "leave of absence" status for each semester in the School of Medicine	86.00
University Center fee, charged each student granted "leave of absence" status, each semester	3.50
Graduation fee	25.00
Returned check fee, charged a student whose check is improperly drafted, incomplete, or returned by the bank for insufficient funds	15.00

PAYMENT OF FEES

The annual fee of $3,000 for the 1973–74 academic year is payable at the rate of $1,500 on or before registration day for each semester. Students registered for the summer session of fourth-year clerkships will be on "continuous registration" without charge until the following fall semester. No student is permitted to complete registration or attend classes until all charges are paid. Tuition and fees are payable at the Office of the Cashier of the University. Checks and postal money orders should be made payable to George Washington University.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. While tuition is due and payable in full as described above, a student may sign a

deferred payment contract with the Student Accounts Office at the time of registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 31, 1973 (for the fall semester), and March 6, 1974 (for the spring semester). Interest at the rate of eight per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made. The University will not obligate itself to notify the student, in advance, of the payment-due date for the second half of the semester charge.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $525 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically charged a $15 late payment fee and will be subject to the interest charge of eight per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his rights to the use of the deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

After a student has entered the course of instruction he is obligated for the tuition for the full semester. A student registered for the clerkships of the summer session is obligated for tuition due at the time of registration for the following fall semester, except that in the case of withdrawal or leave of absence a *pro rata* payment will become due immediately.

Acceptance by the University of a student's fees does not in any way obligate the School of Medicine to accept the student for any subsequent semester or summer session, and the right is reserved to require the withdrawal of any student whenever, in the interest of the student or the School, the Faculty Executive Committee of the School of Medicine deems it advisable to do so.

PROJECTED TUITION INCREASES FOR 1974–78

Academic year tuition increases have been estimated as follows: 1974–75, $200; 1975–76, $200; 1976–77, $200; 1977–78, $200. Every effort will be made to keep tuition increases within these limits. However, it is not possible to project future economic data with certainty, and circumstances may require an adjustment in this estimate.

COST OF TEXTBOOKS AND STUDENT EQUIPMENT

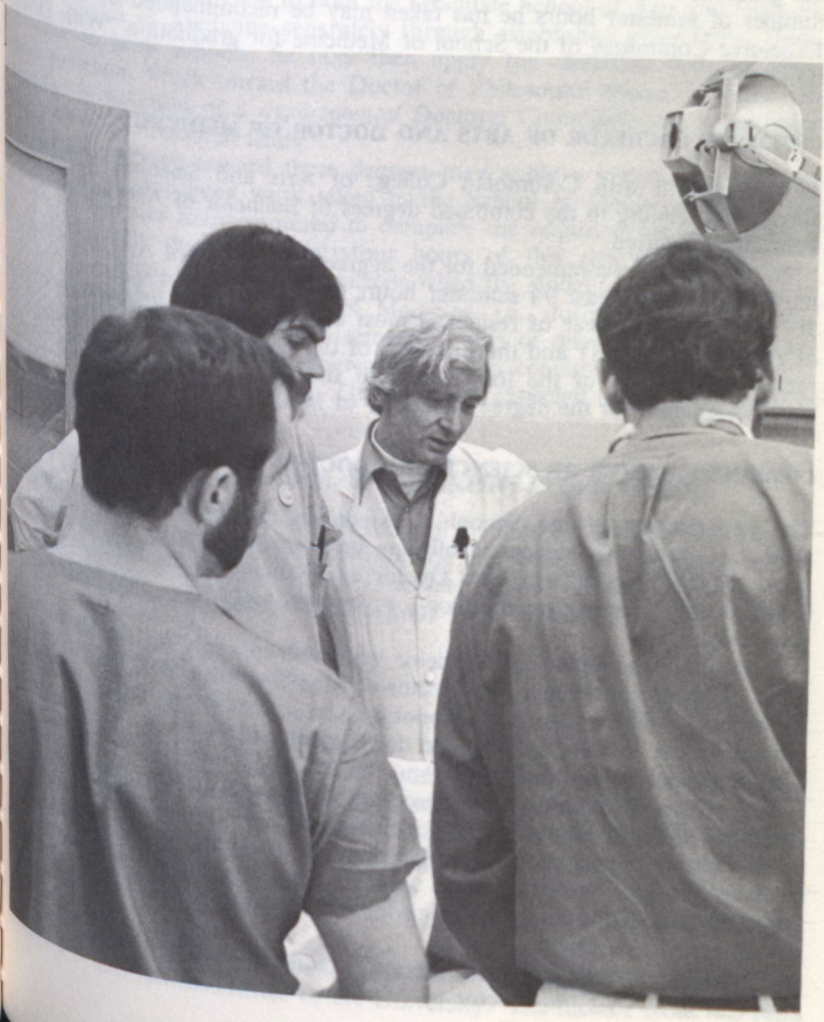
The minimum cost of necessary textbooks and student equipment (microscope, drawing materials, glass slides, clinical thermometer, stethoscope, hemocytometer, uniforms, etc.) is approximately as follows: first year, $700; second year,

$400; third year, $200; and fourth year, $200. Microscopes must be provided by the student. Rentals are not available.

Because many parents may wish some option in meeting and financing all or part of the cost of a college education, the University offers educational loan plans through the Girard Bank, Philadelphia, Pa.; Funds for Education, Inc., Manchester, N.H.; and The Riggs National Bank, Washington, D.C.

Although similar in purpose, these plans vary somewhat in coverage and conditions. One-year and multiple-year plans are available. Insurance covering the life and health of the sponsor is provided through these plans.

Brochures and applications describing these plans are available in the Office of Student Financial Aid, George Washington University, Washington, D.C. 20006.



DEGREES

DOCTOR OF MEDICINE

Every candidate for graduation with the degree of Doctor of Medicine must have satisfactorily completed the requirements of the School of Medicine as described under "Plan of Instruction" on pages 37–39, including no less than four academic years of study as a matriculated student in Medicine. He must have completed all required courses and passed satisfactorily all prescribed examinations.

HONORS

A candidate who has completed the four-year medical course and has received the grade of *H* (Honors) in courses totalling 50 per cent or more of the total number of semester hours he has taken may be recommended by the Faculty Executive Committee of the School of Medicine for graduation "With Distinction."

COMBINED BACHELOR OF ARTS AND DOCTOR OF MEDICINE

In cooperation with Columbian College of Arts and Sciences, a seven-year curriculum leading to the combined degrees of Bachelor of Arts and Doctor of Medicine is offered.

In order to be recommended for the degree of Bachelor of Arts, the candidate must complete at least 94 semester hours of prescribed college work (at least 30 hours and one year of residence must be completed in Columbian College of Arts and Sciences) and the first year of the medical curriculum. Upon satisfactory completion of the fourth year of the medical curriculum the student becomes eligible for the degree of Doctor of Medicine.

COMBINED MASTER OF SCIENCE AND DOCTOR OF MEDICINE

The departments of the School of Medicine cooperate with the Graduate School of Arts and Sciences in offering programs leading to the combined degrees of Master of Science and Doctor of Medicine in the fields of anatomy, biochemistry, genetics, microbiology, mycology, pathology, pharmacology, and physiology.

Students in the School of Medicine who wish to apply for the combined degrees of Master of Science and Doctor of Medicine must meet the requirements for admission to the Graduate School of Arts and Sciences. They must be recommended by the chairman of the department and by the deans of the Graduate School of Arts and Sciences and the Medical Center.

The Master of Science degree program consists of a minimum of 30 semester hours which includes a thesis (equivalent to 6 semester hours). For a Master of Science degree program which does *not* include a thesis, the number of semester hours of graduate course work is determined by the department. The program without the thesis is not an individual student option and is not available in every department.

A maximum of 12 semester hours of credit for graduate-level courses com*pleted as a part of the Doctor of Medicine degree* (and not already applied

toward the Bachelor's degree) will be allowed in fulfillment of the requirements of the Master of Science degree. The remaining semester hours of work, including a thesis if it is required, must be in course work in the basic medical sciences normally required for a Master of Science degree in the Graduate School of Arts and Sciences.

DUAL PROGRAM FOR THE DOCTOR OF MEDICINE AND DOCTOR OF PHILOSOPHY DEGREES

In cooperation with the Graduate School of Arts and Sciences a dual program is available to qualified students who seek both the Doctor of Medicine and Doctor of Philosophy degrees. The requirements which must be fulfilled for both degrees are identical to those currently and separately established in the School of Medicine and the Graduate School of Arts and Sciences.

In order to enter the dual degree program, a prospective student first must apply for and gain admission to both the Graduate School of Arts and Sciences and the School of Medicine separately through established procedures. Upon admission to both schools, he may then apply for affiliation with the dual degree program. Work toward the Doctor of Philosophy degree is performed under the jurisdiction of a *departmental* Doctoral Committee and is available in more than fifty research fields.

A student working toward these degrees may apply a maximum of 24 semester hours of approved work taken in the School of Medicine toward the total of 72 semester hours required to complete the requirements for the Doctor of Philosophy degree. Twenty-four hours of this requirement must be earned in graduate courses during periods when the student is not obligated to full-time enrollment in the School of Medicine, i.e., during summer sessions, vacation periods, etc. The final 24 semester hours of dissertation research toward the Doctor of Philosophy degree may begin concurrently with the final semester of graduate course work. The estimated expected time for completion of this dual program is 6 years.

MASTER OF SCIENCE AND DOCTOR OF PHILOSOPHY REQUIREMENTS

The detailed requirements for the degrees of Master of Science and Doctor of Philosophy are stated in the *Undergraduate and Graduate Catalogue* of the University, which is available at the Graduate School of Arts and Sciences, George Washington University, Washington, D.C. 20006.

FINANCIAL AID

The following fellowships, scholarships, and loan funds are available to students in the School of Medicine. Unless otherwise specified, inquiries should be directed to the Office of the Dean of the Medical Center, George Washington University, 1331 H Street, N.W., Washington, D.C. 20005.

FELLOWSHIPS

Wilbur J. and Edith K. Carr Memorial Fellowship Fund (1965).—By bequest of Edith K. Carr, former Trustee of the University. The income from this fund

provides fellowships in surgery, medicine, or medical research at the George Washington University Hospital.

Samuel Jordan Graham Fellowship in Surgery (1961).—By bequest, in memory of Judge and Mrs. Graham. The income from this fund, up to $2,000, may be used to assist students who are pursuing postgraduate study or research, preferably in surgery, at the School of Medicine.

If no individual is conducting such work or deserving of the award, the income may be used to provide one or more scholarships (to cover tuition and other school expenses deemed appropriate) for students in the School of Medicine. Application should be filed with the Chairman of the Department of Surgery no later than March 1.

Robin Miller Research Fellowship (1953).—A $3,000 fellowship established by bequest of Mrs. Robin Miller for the study of cardiovascular diseases.

Henry Rau Foundation Student Fellowship Grant (1967).—Awarded annually to a student in the School of Medicine for research in cancer and allied diseases at the George Washington University Clinic.

U.S. Public Health Service Training Grants.—Information concerning training grants in fields of the medical sciences is available at the Office of the Dean of the Medical Center.

SCHOLARSHIPS

Scholarships awarded to students in the School of Medicine are credited for the academic year unless otherwise specified. Each holder must carry a full schedule of academic work during the period for which the scholarship is awarded. Applicants should apply on prescribed forms which must be filed in the Office of the Dean of the Medical Center no later than March 15 preceding the academic year for which the scholarship is to be awarded.

Achievement Rewards for College Scientists (ARCS) Foundation, Inc., Scholarship.—Awarded to a student on the basis of financial need and superior grades. Candidates must be citizens of the United States.

Anna Bartsch Hospital Intern Scholarship (1946).—A partial scholarship established by Dr. Anna Bartsch-Dunne as a memorial to her mother. Awarded to a woman intern in the University Hospital.

Anna Bartsch Medical Student Scholarship (1946).—A partial scholarship established by Dr. Anna Bartsch-Dunne as a memorial to her mother. Awarded to a woman in the School of Medicine "of outstanding scholarship, character and promise, who intends to make the practice of medicine her life profession."

Jack I. Bender Scholarship (1967).—A partial scholarship established by the family of Jack I. Bender as a memorial to their father. Awarded annually to a student in the School of Medicine on the basis of academic performance and need.

Everett Lamont Bradley Scholarship (1954).—A partial scholarship, by bequest of Alice R. H. Bradley in memory of her son, for a student in the School of Medicine.

Dr. Edith SeVille Coale Scholarships (1965).—Provided at the request of Dr. Coale for women in the School of Medicine. The scholarships are administered by the Zonta Club of Washington. Application should be made to the Office of the Dean of the Medical Center no later than December 1.

Joseph Collins Foundation Scholarships (1951).—Available to medical

students upon application through the Office of the Dean of the Medical Center.

George Washington University Medical Alumni Scholarships (1965).—One $2,000 scholarship awarded to a student in each of the four classes of the School of Medicine, on the basis of financial need and scholarship.

Health Professions Scholarship Program (1966).—Awarded by the School of Medicine to students who qualify under the provisions of Public Law 89-920. Inquiries should be directed to the Associate Dean for Student Affairs.

Joan Luria Hines Scholarship (1968)—Established by friends, students, and faculty of the School of Medicine as a memorial to the wife of a medical student.

Ki-Wives of Washington Scholarship Fund (1958).—Three tuition scholarships available to students in the School of Medicine.

Sidney A. Levine Scholarship Fund (1971).—Established to assist medical students on the basis of need and academic performance.

Medical Student Research Scholarships and Traineeships.—For student participation in the research programs of the School of Medicine or special training in research methods. Research scholarships are ordinarily awarded for full-time activity during the summer months; research traineeships support part-time work during the academic year. Scholars are "matched" with members of the faculty in accordance with their mutual interests. Trainees are designated by the departments responsible for the programs. These programs have been sponsored by the National Institutes of Health. In addition a number of research scholarships have been made available through the Washington Heart Association.

Chas. Pfizer Medical Scholarship Program (1962).—Established to financially assist a student in the School of Medicine.

School of Medicine Scholarship Fund (1948).—Established by gifts of various donors for tuition awards in the School of Medicine.

David Perry Steinman Memorial Scholarship Fund (1960).—Established by friends and classmates. Awarded annually to a second-year student in the School of Medicine on the basis of need and academic performance.

James J. Whisman Scholarship (1966).—A partial scholarship by bequest of James J. Whisman for needy and deserving students in the School of Medicine.

COLUMBIAN WOMEN SCHOLARSHIP FUNDS

The Columbian Women Scholarships are awarded to women students on the basis of financial need and scholastic attainment. Candidates must have completed a minimum of 15 hours at this University with a minimum *B* (3.0) average, or the equivalent. A letter of application for these scholarships should be addressed to the Chairman, Columbian Women Scholarships, care of the Alumni Office, George Washington University, Washington, D.C. 20006, no later than May 15 for the fall semester, and January 1 for the spring semester. Scholarship aid is awarded from income of the following endowments:

Jessie Fant Evans Scholarship Fund (1967).—A $10,135 fund for tuition aid, established by bequest of Jessie Fant Evans, former Trustee of the University.

Lewes D. and Myrtie H. Wilson Memorial Scholarship Fund (1926).—A fund of $1,000 for tuition aid, established by Elizabeth Wilson as a memorial to her parents.

LOAN FUNDS

American Medical Association Medical Education Loan Guarantee Program (1960).—Available to medical school students (beyond the first semester of medicine).

Catherine Breen Student Loan Fund (1972).—Established by alumni of the School of Medicine in honor of Miss Catherine Breen, former Assistant to the Dean of the Medical Center. Available to needy students who are candidates for the degree of Doctor of Medicine. Applications should be made to The George Washington University Medical Alumni Association.

Edith K. Carr Medical School Loan Fund (1962).—Established by Mrs. Carr for loans to students in the School of Medicine.

Health Professions Student Loan Program.—This fund is available to a full-time student pursuing a course of study leading to the degree of Doctor of Medicine. Interns, residents, students engaged in premedical or other professional training, and students enrolled in programs of study other than those leading to the degree mentioned above are *not* eligible for these loans.

A candidate must (1) be a citizen of the United States or have such immigration status and personal plans as to indicate that he intends to become a permanent resident of the United States, (2) be in need of the amount of the loan to be able to pursue his course of study, and (3) be in good standing with the School. Inquiries concerning deadlines and applications should be directed to the Associate Dean for Student Affairs.

Joseph H. Himes Loan Fund (1956).—Available for loans to students in the School of Medicine.

Robert Wood Johnson Foundation Loan Fund (1972).—Available to medical students who are women, members of designated minority groups, or legal residents of counties of less than 50,000 population, and who are citizens of the United States.

W. K. Kellogg Medical School Loan Fund (1942).—Established by W. K. Kellogg Foundation in Battle Creek, Michigan.

Jessie B. Martin Loan Fund (1967).—Established by friends of Mrs. Jessie B. Martin, former Editor of Academic Publications at the University. An emergency fund for loans up to $250, payable prior to ceasing of enrollment, with interest rate of 3 per cent per annum. Application should be made to the Director or Associate Director of the Office of Student Financial Aid.

Pfizer Medical School Loan Fund (1953).—Established by Chas. Pfizer & Co., Inc.

School of Medicine Loan Fund (1951).—A fund established by medical school students and augmented by bequest from the estate of Ethel L. Murray.

Sutherland Medical School Loan Fund (1941).—Established by Rose L. Sutherland.

W. E. Wrather Medical Student Loan Fund (1967).—Established by gift of Mrs. Alice D. Wrather in memory of her husband.

PRIZES

American Medical Women's Association, Inc., Prize.—A certificate awarded annually to each woman ranking academically in the upper 10 per cent of the graduation class. An additional prize of $100 is awarded to a woman who has the highest scholastic ranking in her graduating class.

Samuel M. and Miriam S. Dodek Prize (1967).—Established in memory of Professor Bernhard Zondek, the eminent discoverer of the endocrinology of the human female reproductive cycle. Awarded annually to a member of the graduating class of the School of Medicine who has attained a commendable knowledge and understanding of the field of female endocrinology.

Allie S. Freed Prize (1957).—Awarded annually to a member of the graduating class in the School of Medicine who has demonstrated exceptional proficiency in the field of preventive medicine.

Walter Freeman Prize (1966).—Awarded annually to a student in the graduating class in the School of Medicine who submits the best essay based on original investigation.

Alec Horwitz Prize (1959).—A prize of $100 awarded annually to a senior who has demonstrated exceptional proficiency in the field of surgery.

Oscar Benwood Hunter Prize (1952).—Established by The George Washington University Medical Society, now known as The George Washington University Medical Alumni Association. Awarded annually to a member of the graduating class of the School of Medicine who has demonstrated outstanding ability in pathology.

Jacobi Medical Society Prize (1962).—Established in memory of Dr. Abraham Jacobi, the founder of pediatrics practice in the United States. Awarded annually to a member of the graduating class of the School of Medicine who has demonstrated outstanding ability in pediatrics.

Howard Kane-A.F.A. King Obstetrical Society Prize (1937).—Established in memory of Dr. Howard Kane and Dr. A.F.A. King, who served as Professors in the School of Medicine. Awarded annually to a member of the graduating class of the School of Medicine who has demonstrated outstanding ability in obstetrics and gynecology.

Lange Medical Publications Prize.—Awarded annually to two members of the graduating class who are considered outstanding by their classmates. The prize consists of the graduate's choice of four books published by Lange Medical Publications.

Huron W. Lawson Prize (1957).—A prize of $100 established by Mrs. Lawson in memory of her husband, who was a distinguished member of the Medical Staff of the University, presented annually to a member of the graduating class who has demonstrated exceptional proficiency in the field of obstetrics and gynecology.

Benjamin Manchester Prize (1966).—Established by a grateful patient in honor of Doctor Benjamin Manchester, Clinical Professor of Medicine. Awarded annually to a member of the graduating class in the School of Medicine who has an outstanding record and shows promise of real humanitarianism in the practice of medicine.

C.V. Mosby Book Prize.—Awarded annually to four members of the graduating class who are considered outstanding by their classmates. The prize consists of the graduate's choice of a book published by C.V. Mosby Company.

Julius S. Neviaser Prize in Orthopaedic Surgery (1956).—A prize of $100 awarded annually to the senior in the School of Medicine who scores the highest grade in a written examination and clinical aspects of orthopaedic surgery.

John Ordronaux Prize (1907).—By bequest, $150 awarded annually to the member of the graduating class of the School of Medicine who has the highest scholastic standing.

Roche Prize.—An Omega watch and a scroll awarded annually to the mem-

ber of the graduating class who best exemplifies the ideals of the modern American physician. The winner is chosen by vote of the graduating class.

William G. Schafhirt Prize (1966).—By bequest, $200 awarded annually to the senior student in the School of Medicine for the best original essay or thesis on some medical subject of current public interest.

Upjohn Achievement Prize.—A prize of $200 and an inscribed plaque awarded annually to a member of the graduating class selected by his or her classmates on the basis of outstanding scholastic and personal achievement.

REGULATIONS

ATTENDANCE

A student is not permitted to attend classes until registration has been completed and fees due have been paid. Regular attendance is required.

GRADES

H—Honors; *P*—Pass; *F*—Failure; *IP*—In Progress; *I*—Incomplete; *W*—Withdraw.

Those students whose performances in a subject, as determined by the department concerned, are of a very high caliber, and who, in addition, have demonstrated those qualities of intellectual curiosity, integrity, and self-discipline which clearly set them apart from the majority of the group, may be assigned the grade of *H* (Honors).

The grade of *P* (Pass) will be assigned to all students who meet the minimum standards of performance in a subject as determined by the department concerned, unless they are entitled to the grade of *H* (Honors).

The grade of *F* (Failure) will be assigned when a student fails to meet the minimum standards of performance in a subject as determined by the department concerned. A student receiving the grade of *F* in any subject may not advance to the work of the following year until he has complied with such recommendations of the Committee on Scholarship as are approved by the Faculty Executive Committee of the School of Medicine.

The grade of *IP* (In Progress) will be assigned temporarily to students in courses which require more than one semester for completion. The grade of *IP* will be converted to a definitive grade upon completion of the course in a subsequent semester.

The grade of *I* (Incomplete) will be assigned when a student fails to complete all the required work in a course for reasons acceptable to the Associate Dean for Student Affairs. A student in the first and second years may not proceed into the work of the following year until a grade of *I* has been removed; if not removed, a grade of *I* will be automatically changed to a grade of *F* (Failure) after one year. A student in the third or fourth years must remove a grade of *I* prior to graduation.

The grade of *W* (Withdraw) will be assigned only when a student is unable to continue in school for reasons acceptable to the Associate Dean for Student Affairs (such reasons may *not* include poor scholarship). Such a student may be readmitted, at the discretion of the Associate Dean for Student Affairs, within a period of two years, and he may repeat for credit the course or courses in which he had been assigned the grade of *W*.

PROBATION

A student who receives grades of *F* in courses totalling 6 or more semester hours in one semester will be placed on academic probation for the following semester. A student who while on probation receives a grade of *F* in any course will be continued on probation for the following semester.

ACADEMIC DISMISSAL

A student (1) who exceeds three semesters, consecutive or otherwise, on probation; or (2) who receives grades of *F* in courses totalling 14 or more semester hours in any academic year; or (3) who receives grades of *F* in courses totalling more than 20 semester hours of work in the School of Medicine; or (4) whose academic achievement is otherwise considered unsatisfactory by the Committee on Scholarship will not be allowed to continue in the School of Medicine.

EXAMINATIONS

Examinations, which may be written, oral, or practical, will be held during and/or at the end of each semester.

All students in the School of Medicine are required to take the Part I and Part II examinations of the National Board of Medical Examiners. A student failing to attain a passing average for the Part I examination in June must repeat the examination in September of the same year and will be registered on academic probation for the following semester.

ACADEMIC DISHONESTY

Academic dishonesty on the part of any student will result in a disciplinary grade of *F* for the course involved and also may, upon the recommendation of the Faculty Executive Committee of the School of Medicine, result in his suspension from the University for a stated period, at the end of which time he may petition for readmission. Upon approval of the Faculty Executive Committee of the School of Medicine, the disciplinary grade of "Failure—Academic Dishonesty" will be recorded for the course involved. A student so suspended shall be withdrawn from all other courses except those in which all work has been completed.

GRADUATION

Application for Graduation.—Application for graduation must be filed in the Office of the Dean and the fee must be paid at the time of registration for the last semester of the senior year.

Presence at Graduation.—A candidate is required to be present at the graduation exercises unless written application for graduation *in absentia* is approved by the Dean.

RIGHT TO DISMISS STUDENTS

The right is reserved by the University to dismiss or exclude any student from the University, or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

RECENTLY ESTABLISHED REGULATIONS

An Appendix (pages 177–79) contains regulations recently approved by the University's Board of Trustees.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

In general, the policy of the University is one of attempting to keep the student's record confidential and out of the hands of those who would use it for other than legitimate reasons. At the same time, the policy must be flexible enough not to hinder the student, the University, or the community in their legitimate endeavors.

No information concerning a student will be released except as noted below:

1. Information such as whether or not the student is currently enrolled; dates of attendance; verification of date and place of birth; degrees earned (if any), date, major field or area of concentration, and honors received; home and local addresses and telephone numbers; school, college, or division of enrollment, and class; verification of signature; name and address of parent or guardian.

2. The issuance of formal transcripts of record to recognized institutions of higher learning; the certification of academic achievement to the various recognized professional associations (law, medicine, engineering, education, etc.).

Additional information will be released only on written authorization from the student, or by court order or subpoena. If a subpoena is served, the student whose record is being subpoenaed will be notified and the subpoena will be referred to the University's legal counsel.

Government investigative agencies have no inherent right to access to student files and records. If expressly requested, properly identified representatives from federal, state, or local government agencies may be given the information listed under No. 1, above.

STUDENT HEALTH SERVICE

The Student Health Service is a general outpatient clinic designed to assist students registered on campus with their health needs. This Service is located at 935 22nd Street, N.W. (in the H.B. Burns Memorial Building).

Physicians are present during the academic year from 9 a.m. to 5 p.m. and from 6 p.m. to 10 p.m., Monday through Friday, and from 9 a.m. to 12 noon on Saturday. This schedule is also maintained during the Summer Sessions, except that the evening closing hour Monday through Friday is 9 p.m.

During hours when the Student Health Service is closed, on-campus students may contact consulting physicians for advice connected with illness or emergency by calling 223-2200 (the Medical Bureau). All callers should always identify themselves as George Washington University students and ask for the physician-on-call. For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. This arrangement is for emergency care only, and all fees are the responsibility of the student.

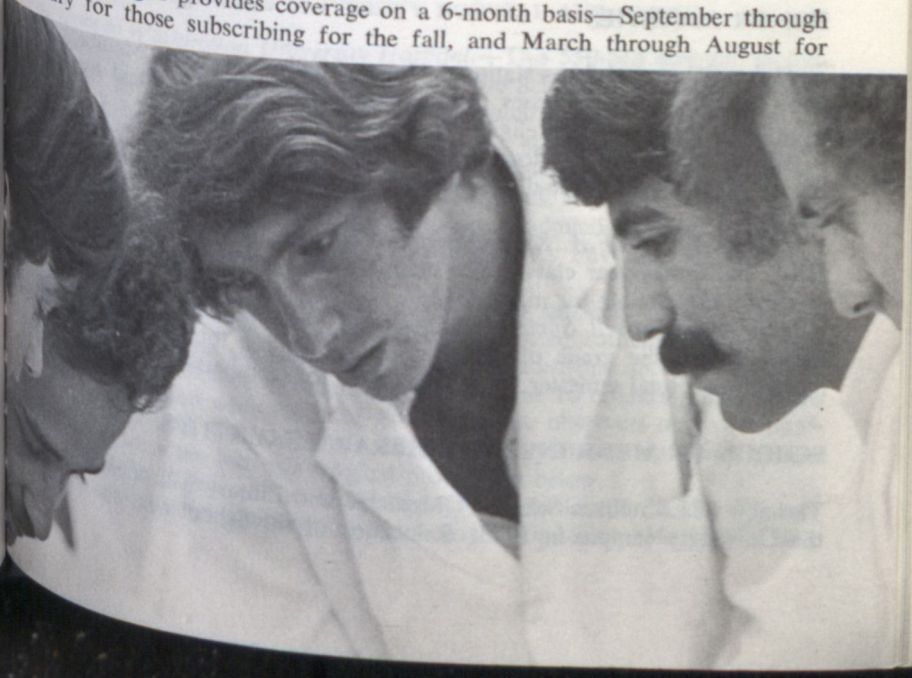
Students must be currently enrolled on campus in the University to receive treatment at the Student Health Service. A student who is not currently enrolled or who has severed his connection with the University is ineligible for medical benefits of the Student Health Service. Any student may engage, if he so desires, physicians and nurses of his own choice, but he will be responsible for all the fees charged. The bills incurred from all services rendered outside of the Student Health Service (for example, laboratory and X-ray work and referrals to specialists or other outside physicians) are the responsibility of the student. Within the Student Health Service, there will be only a few small charges for some services, such as materials for an allergy injection series, overseas immunizations, and certain other services.

Any student who intends to train for an athletic team is required to pass a thorough medical examination. The University is not responsible for injuries received in intercollegiate or intramural games, or in any of the activities of the Department of Physical Education, Health, and Recreation.

HEALTH AND ACCIDENT INSURANCE

The Student Health Service Office has arranged for Health and Accident Insurance, on an elective basis, for *full-time* students. Arrangements for insurance coverage are the responsibility of the student. The University assists in the subscription process by administering application cards and collecting fees during official registration periods. The deadline for enrollment for coverage is the final day of the late registration period.

The fee charged provides coverage on a 6-month basis—September through February for those subscribing for the fall, and March through August for



those subscribing for the spring. The coverage is effective, with minor variations (see available folder), whether the student is at the University, at home, or elsewhere. The fee charged at each official registration period will be the payment required for full coverage for a 6-month period and must be paid in full at the time of subscription.

The policy contract is between the individual student and the insurance carrier and is accepted at any hospital or emergency room that accepts this type of medical coverage. Details of the policy are contained in a folder available at the Student Health Service Office.

PHYSICAL EXAMINATIONS

All first-year students are required to have a comprehensive physical examination prior to admission to the School of Medicine. The students are informed of significant findings and advised regarding such measures as will tend to help them maintain a high standard of health.

In addition medical students benefit from the complete Tuberculosis Case Finding Program which the School maintains. Under this program all students receive tuberculin tests, X-ray examinations, and such special attention from chest specialists as is necessary to reduce to a minimum the dangers from tuberculosis. Students are immunized against those diseases for which proven prophylaxis exists.

RESIDENCE HALLS

Complete information concerning the University's residence halls is available from the Director of Housing, George Washington University, Washington, D.C. 20006. Information concerning off-campus housing may be obtained at this Office and at the Office of the Dean of the Medical Center. Reservations for private housing must be made by students.

HONOR SOCIETIES

Alpha Omega Alpha.—National Honor Medical Society. Members of the third- and fourth-year classes meeting the qualifications specified by the constitution of the Society are eligible for election to membership.

William Beaumont Medical Society.—Medical students showing unusual ability for medical writing and research are elected by the active members of this society.

Howard Kane-A.F.A. King Obstetrical Society.—The fifteen students in the third- and fourth-year classes who maintain the highest grades in their work in obstetrics are eligible for membership.

Smith-Reed-Russell Society.—Students of the third and fourth years who have received the grade of *H* (Honors) in courses totalling 40 per cent or more of their total semester hours are eligible for membership.

SCHOOL OF MEDICINE AND LIBRARY FACILITIES

The new $25.5 million School of Medicine and Library will open at a site on the University campus in 1973. Relocation of the School near the University

Hospital will bring students directly to the clinical center at the outset of their studies. The seven-story Walter G. Ross Hall of Science and the adjoining three-story Paul Himmelfarb Medical Library have been designed for scientific inquiry in pleasant and functional surroundings. In the School of Medicine there are both conventional lecture halls and an unconventional amphitheater lecture-lab where students seated at their benches with their own materials at hand may participate in or observe demonstrations or lectures. Two of the floors are instructional, four are for research. One floor separates these areas and houses photo labs, medical illustration, and audio-visual support services under expert direction for all levels of teaching.

The animal laboratories are noteworthy. Quarantined animals are kept in a holding area below ground level. Other animal rooms are stacked vertically on each research floor and serviced by their own elevators. Facilities are steam-cleanable and cages are self-cleaning, making them virtually odor-free.

The Himmelfarb Library facilities range from a historical room containing rare medical and surgical texts to an audio-visual center designed for the latest self-study educational techniques. It incorporates movie and slide film, sound projection, and recording, as well as a closed circuit system to pick up video-casts from the hospital or clinic. The Library's volume capacity is expandable to 80,000, with 1,500 periodicals. The Library has access to MEDLINE, the on-line direct access information retrieval system developed by the Lister Hill Foundation of the National Library of Medicine.

A branch of the Medical Library is maintained in the University Hospital for the use of the resident physicians, interns, and students.

CLINICAL FACILITIES

Students at the George Washington University School of Medicine receive clinical experience at the University Hospital, the University Clinic, the Warwick Building, and affiliated hospitals.

THE GEORGE WASHINGTON UNIVERSITY HOSPITAL AND CLINIC

The George Washington University Hospital.—This 550-bed hospital, including the Eugene Meyer Pavilion, is adjacent to the School of Medicine. Staffed and directed by the clinical faculty, it is the primary teaching facility for the students and for a large house staff. It is fully approved by the American Medical Association, the American Hospital Association, the American College of Physicians, and the American College of Surgeons, through the Joint Commission for the Accreditation of Hospitals. Annual admissions number approximately 20,000, while the Watson W. Wise Emergency Pavilion receives about 30,000 visits per year.

The University Hospital is equipped to serve 16 specialty fields. Complex teamwork procedures such as kidney dialysis, cardiac catheterization, open-heart surgery, transplant surgery, and total hip replacements are included in its regular activities. Facilities include a surgical suite of 10 operating rooms, two of which are equipped with overhead galleries where observers may communicate with the surgical teams, observe the electronic patient monitoring system in action, and view the intricate surgical procedures below.

The University Clinic.—The University Clinic is housed in the 13-story H. B. Burns Memorial Building adjacent to the University Hospital. Clinic

facilities for each hospital service and for cancer detection are available. Students are assigned for instruction in the University Clinic. Visits of ambulatory patients to the Clinic are approximately 90,000 a year.

The Helen L. and Mary E. Warwick Memorial Building.—This building houses the multitest health screening facility, the surgical primate laboratories, and cancer research. The Department of Clinical Engineering operates the ultramodern multitest facility for computerized diagnostic data. In this facility patients undergo a battery of automated tests; the results are tabulated via computer technology and presented to physicians for clinical analyses.

This building also houses the automated patient information system called MEDLAB, a computerized system that gathers and disseminates continuous physiological data on critically ill patients in the University Hospital.

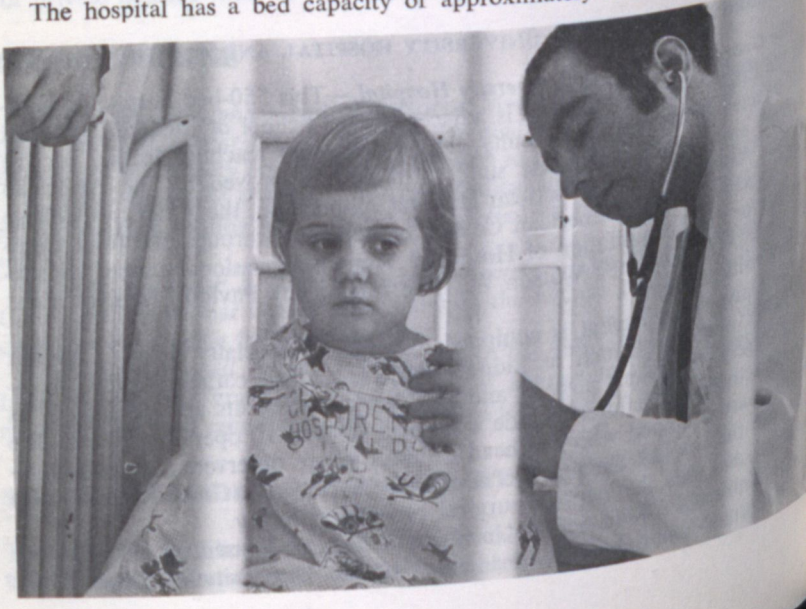
AFFILIATED HOSPITALS

Children's Hospital National Medical Center.—Children's, one of the finest pediatric health care centers in the country, houses 220 inpatient beds, including a specialized referral intensive care nursery and an adolescent unit. Its ambulatory Diagnostic and Treatment Center handles in excess of 120,000 visits a year. Children's is the major base for the School of Medicine's Department of Child Health and Development, and for the assigned pediatric clerkship and a variety of elective clerkships in various aspects of child health.

Columbia Hospital for Women.—This hospital, situated only two blocks from the University Hospital, is utilized by medical students at George Washington University for clinical training in obstetrics and gynecology. Columbia Hospital for Women is an affiliated hospital for residency training in Obstetrics and Gynecology in the George Washington University Medical Center Program.

District of Columbia General Hospital.—The District of Columbia General Hospital, one of the largest general hospitals in the country, is a teaching facility for students in the School of Medicine.

The hospital has a bed capacity of approximately 950. It is the principal



facility for the care of the indigent sick of the community. Annually, the outpatient department has over 193,360 clinic visits; approximately 98,300 patients register in the emergency room, and 22,600 are admitted to the hospital. For the fiscal year 1972, the hospital had a record of 228,453 inpatient days. This is the largest emergency service in the District, where a variety of acute medical and surgical problems are examined and treated.

Fairfax Hospital.—This new and already expanding 530-bed voluntary community teaching hospital serves a burgeoning suburban area and provides all clinical services including psychiatry. Each year over 20,635 patients are admitted, 4,900 babies delivered, 15,000 surgical operations performed, and 49,200 persons examined and treated in the Emergency Suite. Fairfax Hospital offers a rotating internship program, a School of Medical Technology, and clinical facilities for a School of Practical Nursing. Students of the School of Medicine serve at this hospital in clinical clerkship and elective programs. Fairfax Hospital is an affiliated hospital for residency training in Obstetrics and Gynecology in the George Washington University Medical Center Program.

National Naval Medical Center.—The Naval Hospital at the National Naval Medical Center, Bethesda, Maryland, is a 750-bed general hospital offering a wide range of specialized services, clinical research, and educational programs. Medical care is provided to active duty and retired military members and their dependents. It is a major referral center for thoracic and cardiovascular surgery as well as for cancer therapy. The teaching staff directs a complete internship and residency program in 21 specialties.

St. Elizabeths Hospital.—St. Elizabeths Hospital, established by an act of Congress in 1855, is a federal psychiatric hospital administered under the Department of Health, Education, and Welfare. This hospital provides for the treatment, care, and general well-being of approximately 6,000 patients of whom 3,400 are resident. The facility includes a completely approved General Hospital to meet the needs for medical and surgical care and functions with a full-time staff within the hospital plus attending physicians in various specialties. The hospital maintains an up-to-date medical library.

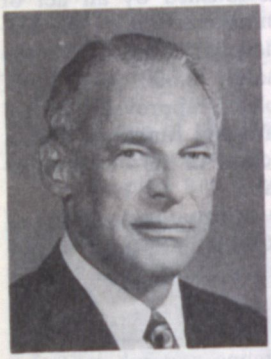
Medical students of George Washington University utilize the facilities of St. Elizabeths for clinical psychiatric training. Opportunities for research are enhanced by a cooperative arrangement with the National Institute of Mental Health of the United States Public Health Service.

Veterans Administration Hospital.—In addition to the medical, surgical, psychiatric, neurological, tubercular, and physical medicine and rehabilitation services, this 700-bed hospital has a large outpatient program; an extensive medical research program; programs in open heart surgery, cobalt therapy, and renal dialysis; a metabolic program; and a specially designed Administrative Research Laboratory.

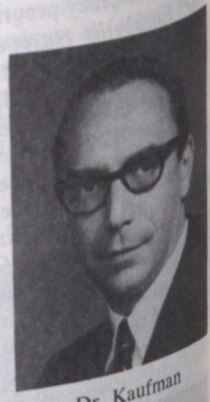
Washington Hospital Center.—This 843-bed private, voluntary institution serves the greater Washington area through a triad of activities: patient care, teaching, and research. The Center is the tenth busiest of more than 7,000 hospitals in the United States and the second busiest private hospital in terms of inpatient admissions. A very active emergency service cares for more than 49,000 patients a year, and the 50 clinics provide all major clinical service except pediatrics for about 65,400 outpatients and 31,740 inpatients yearly. In addition to an extensive approved internship and residency program, the Center offers organized instruction for nurses, laboratory and X-ray technicians, medical secretaries, and other health-related vocations.

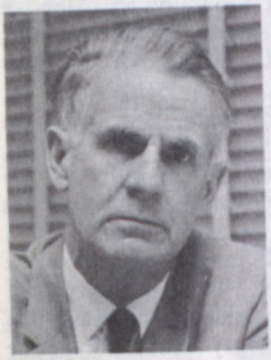
OFFICERS OF ADMINISTRATION OF THE MEDICAL CENTER

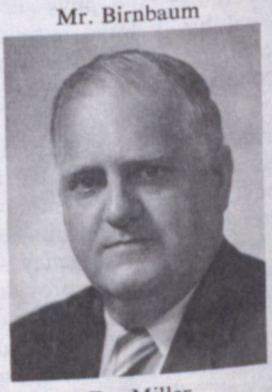
James Joseph Feffer, B.A., M.D., *Acting Dean of the Medical Center*
Philip Stanley Birnbaum, M.S. in M.E., B.C.E., *Associate Dean of the Medical Center, for Administrative Affairs*
Ronald Paul Kaufman, B.S., M.D., *Associate Dean of the Medical Center, for Clinical Affairs; Medical Director of the University Hospital*
Clarence Alfred Lowe, B.A., Ed.M., *Associate Dean of the Medical Center, for Research*
Frank Nelson Miller, Jr., B.S., M.D., *Associate Dean of the Medical Center, for Student Affairs*
John Patrick Naughton, B.S., M.D., *Acting Associate Dean of the Medical Center, for Academic Affairs*
Calvin Trexler Klopp, B.A., M.D., *Medical Director of the University Clinic*
Victor Frederick Ludewig, B.S., *Administrator for Clinical Affairs*
Phillip Whitney Spaulding, B.A., M.S., *Administrator of the University Hospital*
Paul Walter Joy, B.A., M.S., *Associate Administrator for Clinical Affairs*
Donald Knox Hames, B.S., *Budget Officer of the Medical Center*
Thomas James Carroll, B.B.A., *Associate Budget Officer of the Medical Center*
Isabella Frances Young, M.S., *Librarian of the Medical Center*


Dr. Feffer

Mr. Birnbaum


Dr. Kaufman


Mr. Lowe


Dr. Miller

Dr. Naughton

COMMITTEES*

FACULTY EXECUTIVE COMMITTEE

P.C. Adkins, J.P. Adams, F.D. Allan, G.A. Kelser, Jr., H.G. Mandel, R.H. Parrott, H.V. Rizzoli, Mario Werner, M.D. Paul *(House Staff Representative)*, R.G. Gloster *(Student Representative)*

COMMITTEE ON ADMISSIONS

Robert Keimowitz *(Chairman)*, L.F. Affronti, Paul Calabrisi, D.H. Glew, Jr., Milton Gusack, Marilyn Koering, John LaRosa, A.M. Margileth, Joan Sealy, W.G. Tompkins, G.A. Walker, Katherine Thomas *(Student Representative)*, D.D. Wilson *(Student Representative)*

COMMITTEE ON EDUCATIONAL POLICY

T.G. Webster *(Chairman)*, Gordon Avery, L.T. Bowles, Marie Cassidy, O.W. Donnelly, Milton Gusack, W.N. Jensen, P.I. Kenmore, R.A. Kenney, M.J. Malone, H.G. Mandel, T.E. Piemme, G.H. Reifenstein, Carolyn Robinowitz, J.C. Smith, R.S. Snell, N.T. Tsangaris, G.V. Vahouny, Cathryn Kaiser *(Student Representative)*, R.C. Ripley *(Student Representative)*, P.M. Sarafan *(Student Representative)*, S.L. Shapiro *(Student Representative)*, Arthur D. Kirsch *(ex officio)*

COMMITTEE ON SCHOLARSHIP

B.W. Smith *(Chairman)*, E.N. Albert, Alexander Breslow, Milton Corn, H.M. Grigorian, R.M. Kaufman, J.G. Randolph, Elizabeth Tidball

COMMITTEE ON RESEARCH

C.R. Treadwell *(Chairman)*, G.P. August, K.L. Becker, S.H. Danovich, M.J. Jackson, W.L. Joseph, C.A. Lowe, A.E. Parrish, P.O. Periman, Melvin Reich, Harold Stevens, Mario Werner, A.D. Rabinowitz *(Beaumont Society Representative)*

COMMITTEE ON EDUCATIONAL COMMUNICATIONS (Library and Audio-visual Services)

F.D. Allan *(Chairman)*, Halla Brown, T.C. Chalmers, Michael McCally, Marion Corddry, Irving Mohler, Mary Louise Robbins, C.S. Tidball, Benny Waxman, Daniel Yett, Isabella Young, Elizabeth Adams *(Student Representative)*, P.R. Starke *(Student Representative)*

COMMITTEE ON CONTINUING MEDICAL EDUCATION

S.A. Schroeder *(Chairman)*, J.A. Curtin, D.W. Delaney, F.C. Derrick, Jr., Mitchell Edson, J.L. Marlow, William Newman, J.J. Rheingold, A.B. Rosenbaum, S.J. Talpers, H.J. Zimmerman, David Caldwell *(House Staff Representative)*

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* The committee members are for the academic year 1972–73.
The Vice President for Medical Affairs, the Dean and Associate Deans of the Medical Center, and the President of the Medical Alumni Association are ex officio members of all committees.

COMMITTEE ON APPOINTMENTS AND PROMOTIONS

G.A. Kelser, Jr. *(Chairman)*, P.C. Adkins, R.A. Kenney, W.S. McCune, R.H. Parrott, T.M. Peery, F.A. Villarreal *(Student Representative)*

COMMITTEE ON PUBLIC AFFAIRS

F.C. Derrick, Jr. *(Chairman)*, F.D. Allan, Marion Corddry, Mervyn Elgart, Dennis Falk, S.M. Fox III, M.J. Halberstam, M.C. Korengold, John McGrath, R.A. Noble, Frances Weed, M.D. Manley *(Student Representative)*

STEERING COMMITTEE ON DATA PROCESSING

W.S. Yamamoto *(Chairman)*, C.H. Klingenmaier, V.F. Ludewig, J.W. Millar, J.C. Rios, C.S. Tidball, Mario Werner

COMMITTEE ON ANIMAL FACILITIES

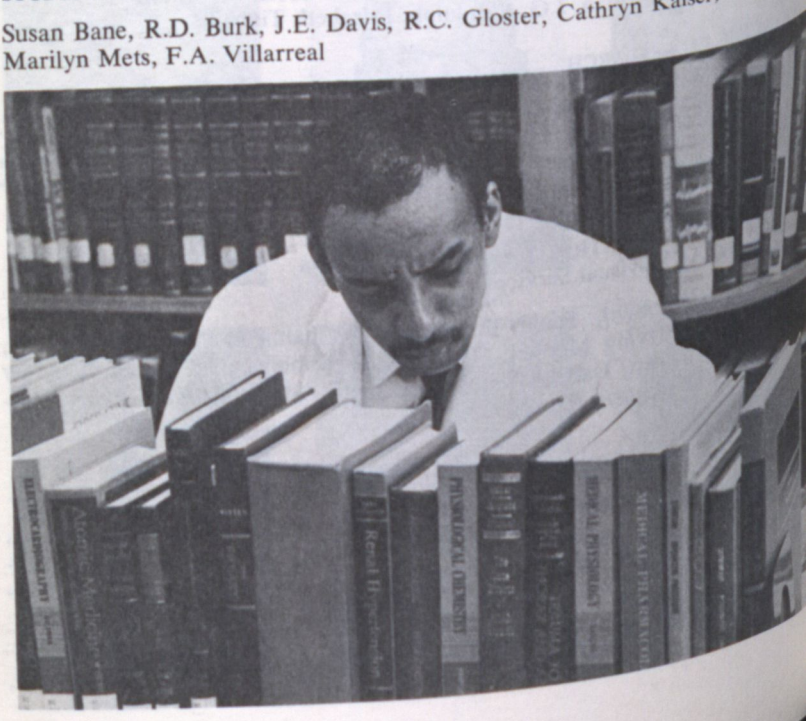
J.A. Straw *(Chairman)*, J.M. Bailey, Marie Cassidy, W.L. Joseph, P.O. Perkman, B.C. Zook

COMMITTEE ON RESEARCH FACILITIES

C.A. Lowe *(Chairman)*, W.L. Joseph, H.G. Mandel, A.E. Parrish, C.R. Treadwell

STUDENT ADVISORY COMMITTEE

Susan Bane, R.D. Burk, J.E. Davis, R.C. Gloster, Cathryn Kaiser, D.G. Lewis, Marilyn Mets, F.A. Villarreal



ALUMNI AND ALLIED ASSOCIATIONS

THE GENERAL ALUMNI ASSOCIATION

THE OBJECTIVES OF THIS ASSOCIATION are to unite graduates who wish to associate themselves for charitable, educational, literary, and scientific purposes, and to promote the general welfare of the University.

Eligible members are those who have matriculated in any school of the University and left the University in good standing, or any person who is or has been a member of the teaching, research, or administrative staff of the University, or of the Board of Trustees of the University. Active members are those eligible members who are current contributors (dues or otherwise) to or life members of the George Washington University General Alumni Association, the Alumni Association of any school of the University, or contributors to the Annual Support Program.

The Alumni Office is in Bacon Hall, 2000 H Street, N.W., Washington, D.C. 20006. All alumni are urged to keep the Alumni Office informed of changes of address or occupation and to supply information with regard to their fellow alumni.

THE GEORGE WASHINGTON UNIVERSITY MEDICAL ALUMNI ASSOCIATION

The George Washington University Medical Alumni Association, incorporated in 1959, continues the organization previously known as the George Washington University Medical Society.

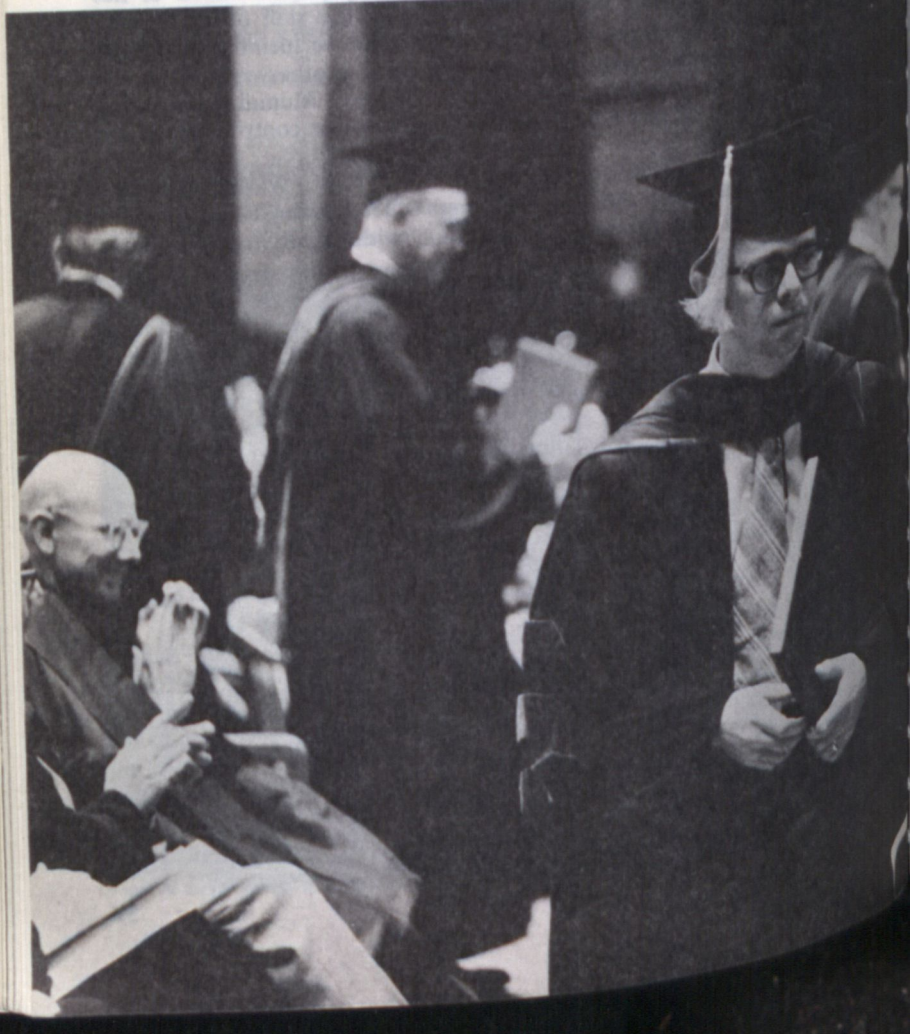
The stated purposes of the Association are as follows: "This shall be a non-profit organization international in scope, whose objectives shall be to provide constructive services for the alumni of the George Washington University School of Medicine, for furthering the art and science of medicine, research, and for the promotion of the welfare of the George Washington University School of Medicine, its students, the George Washington University Hospital and its trainees."

Active membership in the Association consists of all graduates of the School of Medicine; current members and, on application, past members of the teaching staff of the School of Medicine who hold doctoral degrees; Doctors of Medicine who have had one or more years of postgraduate training in the George Washington University Hospital. Junior membership consists of all members of the student body of the School of Medicine during the time they are students.

The Medical Alumni Association maintains an office in the School of Medicine.

OFFICERS FOR 1972–73

President—Marvin P. Footer, B.A. 1938, M.D. 1942
President Elect—Donald H. Glew, Jr., M.D. 1948
First Vice President—Dee R. Parkinson, M.D. 1943
Second Vice President—John F. Mermel, M.D. 1960
Secretary—Carlos A. Silva, M.D. 1960
Treasurer—Burton S. Epstein, M.A. 1954, M.D. 1957
Council:
Jerome W. Canter, M.D. 1955
Jerome H. Epstein, B.A. 1948, M.D. 1953
Maurice T. Gromet, B.A. 1931, M.D. 1934
Sidney A. Levine, M.D. 1941
Kent A. Peterson, B.A. 1956, M.D. 1959
Morris Rosenberg, B.A. 1938, M.D. 1941
George Speck, M.D. 1941
Charles W. Thompson, M.D. 1941
Eric Wagshal, B.A. 1967, M.D. 1970
Allan Zellis, M.D. 1941



COURSES OF INSTRUCTION

PLAN OF INSTRUCTION FOR THE DOCTOR OF MEDICINE DEGREE

THE FACULTY AND ADMINISTRATION of the School of Medicine have developed and initiated a program of medical education through careful study of past performance, present opportunity, and future need. However, the curriculum is under constant study, and the program described below is subject to revision.

Students differ widely in their interests and abilities. Each student is encouraged to maximal achievement within his own limits. This is accomplished by a balanced program of required and elective courses that permit individual scholarly development in specialized medical sciences and research.

The curriculum provides graduated instruction, beginning with the basic medical sciences and expanding to include the more complex aspects of health maintenance and care of the sick. It provides a broad basic preparation for a career in medicine.

In the first year, the schedule begins with an orientation period designed to introduce the new students to the Faculty, the upperclassmen, and the environment for their medical education.

The first semester is devoted to the study of the sciences (anatomy and biochemistry) concerned with the structure and composition of the normal human body. In the second semester of the first year, the science of normal function is further emphasized by courses in physiology. These studies of the normal provide a basis for emphasis on health maintenance, which is a strong positive characteristic of the University's new teaching program. During the second semester the student is also introduced to the concept of disease in a course in microbiology, where the various microbial agents and their effects upon the human body are studied. A basic behavioral science course in this semester deals with the normal development of the person. Elective courses are offered in the second semester of the first year and provide an opportunity for the student to begin the development of special interests under the guidance of skilled advisers.

The basic courses of the first semester of the second year are pathology, pharmacology, and psychopathology. In pathology the student learns the nature and causes of disease as well as the alterations produced by disease in the tissues and fluids of the human body. He learns to recognize and evaluate the significance of the abnormal. Pharmacology provides an understanding of the mode of action of the various agents employed in the treatment of the

sick, and emphasizes the safest and most effective means for their use. Psychopathology introduces the student to aberrant mental mechanisms. Opportunities for elective study are increased during the second year.

The second semester of the second year is planned to acquaint the student with the principles and methods of clinical diagnosis and therapy, and to develop in him an awareness of the physician's responsibility to his patients. The basic concepts of laboratory medicine are taught in special laboratory facilities. During the second semester of the second year, three half-days are available each week for electives, mainly in pathology and pharmacology.

During the third and fourth years, each student has a 12-month rotating clinical clerkship assignment in the University Hospital and Clinic and in affiliated hospitals. Patients with a wide variety of illnesses are assigned to each

student for close personal study under the guidance of a faculty skilled in the various specialties of medical practice. In the course of the clerkship, the student is given increasing responsibility as he demonstrates competence and professional maturity.

During a 28-week career elective period, each student has an opportunity to explore general practice, specialty practice, or areas of research which may be of help in deciding the direction of his career. Students with exceptional interests and proven ability may be permitted to spend their elective period in other universities, including those of foreign countries, but most students will find ample opportunities in the University's own published schedule of approximately 150 different electives for seniors.

Courses in the recently established Department of Clinical Engineering are available for elective credit to students interested in this increasingly important field.

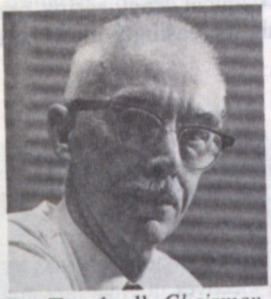
CURRICULUM

FIRST YEAR	TERM I (16 weeks)	**A. The Basic Medical Sciences** ANATOMY AND BIOCHEMISTRY
	TERM II (16 weeks)	PHYSIOLOGY, MICROBIOLOGY, AND BASIC PSYCHIATRY plus 3 semester-hour credits of electives in Anatomy and Biochemistry
(16-week vacation)		
SECOND YEAR	TERM III (16 weeks)	PATHOLOGY, PHARMACOLOGY, AND BASIC PSYCHIATRY plus 3 semester-hour credits of electives in Physiology and Microbiology
	TERM IV (16 weeks)	**B. Introduction to Clinical Medicine** PHYSICAL DIAGNOSIS, LABORATORY MEDICINE, INTRODUCTORY CLINICAL LECTURES plus 4 semester-hour credits of electives in Pathology, Pharmacology, and others
(16-week vacation)		
THIRD AND FOURTH YEARS (the last 88 weeks in rotation, including 8-week vacation)	CLINICAL CLERKSHIPS (52 weeks)	**C. Patient Care** INPATIENT CLERKSHIPS: Anesthesiology (2 weeks), Psychiatry (4 weeks), Medicine (12 weeks), Surgery (12 weeks), Obstetrics and Gynecology (8 weeks), Child Health and Development (8 weeks) OUTPATIENT CLERKSHIPS: General Medicine and Emergency Room (6 weeks)
	ELECTIVES (28 weeks)	**D. Career Electives** SUPPLEMENTARY CLINICAL CLERKSHIPS OR BASIC SCIENCE OR CLINICAL RESEARCH

SCHOOL OF MEDICINE DEPARTMENT CHAIRMEN

Dr. Snell, *Chairman*
Anatomy

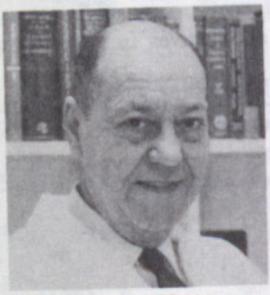
Dr. Coakley, *Chairman*
Anesthesiology



Dr. Treadwell, *Chairman*
Biochemistry

Dr. Parrott, *Chairman*
Child Health
and Development

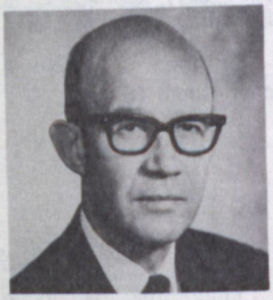
Dr. Yamamoto,
Chairman
Clinical Engineering



Dr. Higdon, *Chairman*
Dermatology

Dr. Millar, *Chairman*
Epidemiology and
Environmental Health

Dr. Head, *Chairman*
Medical and
Public Affairs



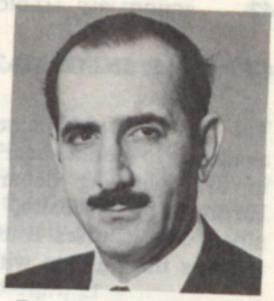
Dr. Jensen, *Chairman*
Medicine

Dr. Affronti,
Acting Chairman
Microbiology

Dr. Rizzoli, *Chairman*
Neurological Surgery

Dr. O'Reilly, *Chairman*
Neurology

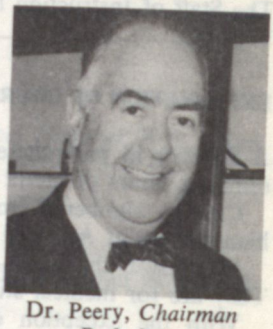
Dr. Sites,
Acting Chairman
Obstetrics and Gynecology



Dr. Armaly, *Chairman*
Ophthalmology

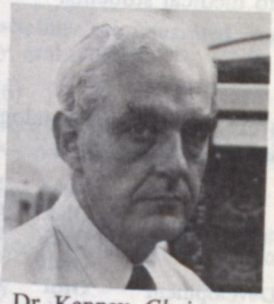
Dr. Adams, *Chairman*
Orthopaedic Surgery

Dr. McFarland,
Chairman
Otolaryngology

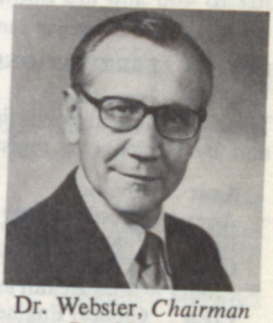


Dr. Peery, *Chairman*
Pathology

Dr. Mandel, *Chairman*
Pharmacology



Dr. Kenney, *Chairman*
Physiology



Dr. Webster, *Chairman*
Psychiatry and
Behavioral Sciences

Dr. Rockoff, *Chairman*
Radiology

Dr. Adkins, *Chairman*
Surgery

Dr. Derrick, *Chairman*
Urology

GENERAL INFORMATION ON COURSES OF INSTRUCTION

The School of Medicine serves other divisions of the University by making available to nonmedical students certain undergraduate and graduate courses in the following departments: Anatomy, Biochemistry, Epidemiology and Environmental Health, Microbiology, Pathology, Pharmacology, and Physiology. The courses listed are subject to some slight change. The University reserves the right to withdraw any course announced.

STAFF OF INSTRUCTION

The Staff of Instruction listed under each Department is for the academic year 1972–73.

EXPLANATION OF COURSE NUMBERS AND SYMBOLS

A number in parentheses after the name of the course indicates number of semester hours of credit which may be earned.

Courses numbered from 101 to 200 are for third- and fourth-year Columbian College of Arts and Sciences students.

Courses in the basic science departments are numbered from 201 to 400. They are for medical students and graduate students in the Arts and Sciences.

With the exception of 200-series basic science courses offered by some clinical departments, courses in the clinical departments are numbered from 301 to 400 and are limited to medical students.

KEY TO ABBREVIATIONS

The following abbreviations are used in this catalogue for course designations and by students in registering for classes.

Anat	Anatomy
Anes	Anesthesiology
Bioc	Biochemistry
Chem	Chemistry
ChHD	Child Health and Development
ClEn	Clinical Engineering
ClSc	Clinical Sciences
Derm	Dermatology
Epid	Epidemiology and Environmental Health
Math	Mathematics
M&PA	Medical and Public Affairs
Med	Medicine
Micr	Microbiology
N Su	Neurological Surgery
Neur	Neurology
Ob&G	Obstetrics and Gynecology
Opth	Ophthalmology
Orth	Orthopaedic Surgery
Otol	Otolaryngology
Path	Pathology
Phar	Pharmacology
Phys	Physics
Phyl	Physiology
Pchi	Psychiatry and Behavioral Sciences
Rad	Radiology
Surg	Surgery
Urol	Urology

REGISTRATION FOR CAREER ELECTIVES 1973–74

During the senior year each student is required to complete seven career electives of four weeks each. The remaining two 4-week periods are for vacation.

Registration will be conducted on September 5, 1973, for the first five periods see below).

September 10–October 7
October 8–November 4
November 5–December 2
December 3–December 30
December 31–January 17

Registration will be conducted in January, 1974, for the four remaining periods (see below). Special arrangements for registration will be made for students who are away on electives.

January 28–February 24
February 25–March 24
March 25–April 21
April 22–May 19

Anatomy

Chairman: R.S. Snell

Professors Paul Calabrisi, C.M. Goss *(Visiting—Medical History)*, F.D. Allan, T.N. Johnson, R.S. Snell
Professorial Lecturers J.L. Angel, T.S. Reese
Associate Professors J.B. Christensen, E.N. Albert
Associate Clinical Professor R.N. Brown
Associate Professorial Lecturers J.A. Di Paolo, L.E. Church, Joan Blanchette-Mackie
Assistant Professor Marilyn Koering

*201 **Anatomy** (12) Staff
All anatomical disciplines are integrated: regional gross dissection, histology, neuroanatomy, embryology. (Fall)

202 **Gross Anatomy** (6) Christensen and Staff
For graduate students. Regional dissections of adult cadaver supplemented with lectures and X-rays. Laboratory fee, $30. (Fall)

203 **Human Embryology** (1) Allan
For graduate students. Origin and development of human body; emphasis on value of embryology in interpreting anatomical anomalies. (Fall)

204 **Neuroanatomy** (2) Johnson and Staff
For graduate students. Gross and microscopic anatomy of central nervous system and special senses. Laboratory fee, $13. (Fall)

205 **Microscopic Anatomy** (3) Staff
For graduate students. Microscopic structure of cells, tissues, and organs of the human body. Laboratory fee, $13. (Fall)

221–22 **Seminar** (1–1) Staff
For graduate students. Research reports and discussions of special topics by staff and graduate students. Medical students encouraged to attend. (Academic year)

249 **Introduction to Anatomical Research** (1) Staff
For graduate students. Major research techniques as applied to biological materials in the various anatomical disciplines. (Fall)

*Required for medical students.

252 **Physical Anthropology** (1) Angel
Variations in man and factors affecting him, human evolution and racial differences, anatomy and culture of ancient man. (Spring)

254 **Fetal Anatomy** (2) Allan
Dissection of early and late human fetus. Comparison of fetal and adult structures. 20 students. Laboratory fee for nonmedical students, $10. (Spring)

256 **Human Genetics** (1) C.B. Jacobson
General principles of genetics, new cytogenetics techniques, aneuploidy in man and its significance, biochemical aspects of heredity, genetic counseling. (Spring)

258 **Cytology** (3) Albert and Staff
Detailed study of morphology and function of the cell and its organelles. Basic cytological techniques emphasized. Laboratory fee for nonmedical students, $20. (Spring)

260 **Electron Microscopy in Cellular Biology—Lecture** (1) Koering
Anat 260 may be taken without 261. (Spring)

261 **Electron Microscopy in Cellular Biology—Laboratory** (2) Koering
Prerequisite or concurrent registration: Anat 260. 12 students. Laboratory fee for nonmedical students, $15. (Spring)

262 **Gross Anatomy of Upper and Lower Extremities** (2) Christensen
Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. 24 students. Laboratory fee for nonmedical students, $10. (Spring)

264 **Gross Anatomy of Head and Neck** (2) Christensen
Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. 24 students. Laboratory fee for nonmedical students, $10. (Spring)

266 **Gross Anatomy of Thorax and Abdomen** (2) Christensen
Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. 24 students. Laboratory fee for nonmedical students, $10. (Spring)

268 **Gross Anatomy of Pelvis, Perineum, and Lower Extremity** (2) Christensen
Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. 24 students. Laboratory fee for nonmedical students, $10. (Spring)

270 **Dissection of the Human Brain** (1) Johnson
Dissection of major pathways and nuclei of the brain with consideration of ventricular system; conferences and assigned reading. 20 students. Laboratory fee for nonmedical students, $10. (Spring)

272 **Autonomic Nervous System** (1) Allan
Development, microscopic and gross anatomy, function of central and peripheral components of autonomic nervous system. (Spring)

276 **Advanced Studies in Anatomy** (1) Staff
Lectures and conferences on selected anatomical subspecialities—endocrinology, teratology, growth, etc. May be repeated for credit. (Spring)

278 **History of Anatomy and Surgery** (1) Goss
Lectures and discussions related particularly to the lives and times of outstanding contributors to the advancement of the science of anatomy and surgery. (Spring)

279 **Regional Anatomy** (5) Christensen
Advanced dissection of abdomen, thorax, or head and neck. 4 seniors; 4-week elective periods. School of Medicine (September–May)

280 **Regional Anatomy** (5) Calabrisi
Advanced dissection of upper and lower extremities, or lower extremities and pelvis. 4 seniors; 4-week elective periods. School of Medicine (January 28–March 24)

281 **Neonatal Anatomy** (5) Allan
Detailed dissection of newborn or late fetus. 4 seniors; 4-week elective periods. School of Medicine (January 28–March 24)

282 **Advanced Neuroanatomy** (5) Johnson
Detailed dissection of human adult brain. 5 seniors; 4-week elective periods. School of Medicine (January 28–March 24)

283 **Introduction to Neuroanatomical Research** (5) Johnson
Techniques and principles of research in neuroanatomy. 5 seniors; 4-week elective periods. School of Medicine (January 28–March 24)

286 **Microangiography and Microradiography** (5) Christensen
Intimate vasculature of selected organs by injection and radiography. 2 seniors; 4-week elective periods. School of Medicine (September–May)

287 **Human Cytogenetics** (10) C.B. Jacobson
Chromosomal research on reproductive anomalies, congenital malformations, mutagenic assay. Tissue culture, photomicrography, karyotypic analysis, genetic counseling. 2 seniors; 8-week elective periods. Univ. Hosp. (September–May)

295 **Research** (arr.) Staff
Content differs each time course is offered; may be repeated once for credit. Fee to be arranged. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Anesthesiology

Chairman: C.S. Coakley
Associate Chairman: B.S. Epstein

Professors C.S. Coakley, Seymour Alpert, B.S. Epstein
Associate Professors W.L. Marsh, Paula Kaiser, Patricia Russell, Marie-Louise Kennedy, Arthur Peschin, G.A. Morales, Herbert Weintraub
Associate Clinical Professor S.N. Albert
Assistant Professors C.H. Klingenmaier, Hildegard Manitsas, Mary Salto, B.S. Dunbar, M.J. Shaffer *(Research)*, J.B. Craft, Jr., J.E. Zimmerman
Assistant Clinical Professors W.E. Bageant, Chalom Albert, Philip Lowenthal, R.R. Ritter
Clinical Instructors Nan-Huan Char, C.D. Lee

Staff

*302 **Clinical Clerkship**
Clinical preoperative evaluation, surgical and obstetrical anesthesia, infant and adult resuscitation, inhalation therapy, management of patients in coma, shock, and other problems which may be encountered in medical practice. 1 week—Univ. Hosp., 1 week—Wash. Hosp. Center (2-week periods throughout academic year)

Weintraub

380 **Anesthesiology** (5)
Clinical preoperative evaluation, surgical and obstetrical anesthesia, infant and adult resuscitation, inhalation therapy, monitoring and blood gas determinations. 2 seniors; 4-week elective periods. Univ. Hosp. (September–May)

Lowenthal

381 **Anesthesiology** (5)
Clinical preoperative evaluation, surgical and obstetrical anesthesia, infant and adult resuscitation; inhalation therapy; blood volume determinations. 2 seniors; 4-week elective periods. Wash. Hosp. Center (September–May)

Staff

383 **Pediatric Anesthesia** (5)
Clinical preoperative evaluation, pediatric anesthesia, infant resuscitation. 2 seniors; 4-week elective periods. Children's Hosp. (September–May)

Klingenmaier, Dunbar

384 **Special Care Unit** (5)
Evaluation and management of respiratory failure, rationale and use of automatic ventilators, chronic airway management, cardiovascular support, and intensive care. 1 senior; 4-week elective periods. Univ. Hosp. (September–May)

Klingenmaier

385 **Automated Patient Monitoring** (5)
Automated patient monitoring techniques, introduction to programming of physiologic data for the management of critically ill patients. 2 seniors; 4-week elective periods. Warwick Bldg. (September–May)

390 **Extramural Anesthesiology Elective** (arr.)
The Department arranges for students to spend elective periods at other institutions. Interested students should contact Dr. Herbert Weintraub.

* Required for medical students. Part of Med 308. Credit assigned after completion of Med 308.

Biochemistry

Chairman: C.R. Treadwell

Professors C.R. Treadwell, B.W. Smith, G.V. Vahouny, J.M. Bailey, Helen Hess
Professorial Lecturers W.W. Burr, Jr. *(Isotopes)*, Edward Steers, Jr., W.F. Anderson *(Genetics)*, Gordon Guroff, A.N. Schechter, G.F. Combs, Steven Levisohn
Assistant Professors G.A. Walker, Linda Gallo *(Research)*
Lecturer P.H. Fishman
Special Lecturers Walter Mertz *(Inorganic Metabolism)*, J.C. Smith, Jr.

*201 **Medical Biochemistry** (8) Staff
Lectures and laboratory; emphasis on basic principles and their relation to medicine. (Fall)

221–22 **General Biochemistry** (4–5) Vahouny
For graduate students. Lectures and laboratory. Prerequisite: Chem 152, 154, or equivalent. Material fee, $20 a semester. (Academic year)

224 **Biochemistry of Enzymes** (1)
Biochemistry of enzymes and enzyme reactions. Prerequisite: Bioc 201 or 221. (Fall)

225 **Biochemistry Procedures** (3) B. Smith and Staff
Laboratory course. Material fee for nonmedical students, $16. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

227 **Biochemistry Seminar** (1) Staff
Current literature in biochemistry, mainly for graduate students, but open to limited number of specially qualified medical students. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

232 **Proteins and Amino Acids** (1) Steers
Prerequisite: Bioc 221. (Fall)

241 **Isotopes** (3) Burr
Theoretical characterization of isotopes and their applications in biology and medicine. Attention given to counting, health physics and radiation safety, autoradiography, chromatography. Laboratory fee for nonmedical students, $16. (Spring)

251 **Carbohydrate Metabolism** (1)
Prerequisite: Bioc 201 or 222. (1973–74 and alternate years: spring)

252 **Biochemistry of the Brain** (1) Staff
For medical students; open to limited number of graduate students. Recent biochemical developments in structure, functions, and metabolic processes unique to the brain. (Spring)

254 **Human Nutrition** (1) Combs
For medical students; open to limited number of graduate students. Application of nutritional principles in humans. (Spring)

*Required for medical students.

256 **Biochemistry of Organ Function** (1) N. Kramer
For medical students; open to limited number of graduate students. Emphasis on biochemical processes unique to particular organ systems; application of these processes to evaluation of function. (Spring)

258 **Inherited Metabolic Diseases** (1) Levisohn
For medical students; open to limited number of graduate students. Contribution of molecular biology to understanding of human mutations and hereditary diseases. Specific disease states and genetics of protein structure discussed. Prerequisite: Bioc 222. (Spring)

260 **Biochemistry of the Steroids** (1) O. Dodek
For medical students; open to limited number of graduate students. Basic chemistry of the steroids, pathways of biosynthesis and metabolism, regulatory mechanisms, physiologic effects, clinical measurement of endogenous steroids, clinical manifestations of steroid imbalance, steroid changes in pregnancy, and steroid therapy. (Spring)

262 **Biochemistry of the Lipids** (1) Vahouny
For graduate students; open to maximum of 15 medical students. 1973–74 and alternate years: chemistry, properties, occurrence of important classes of biological lipids. 1974–75 and alternate years: metabolism of lipids, including digestion, energy production, biosynthesis, function in specialized tissues and subcellular structures. Content differs each time course is offered; may be repeated for credit. (Spring)

266 **Biochemical Genetics** (1) Anderson
For medical students; open to limited number of graduate students. (Spring)

268 **Biochemistry of Bone and Muscle** (1) Walker
Study of structure, chemistry, and biochemistry as they relate to the normal and diseased states of bone and muscle; emphasis on current theories and techniques. (Spring)

279 **Research in Renal Function, Mutarotase, and Sugar Transport** (10) Bailey
Clinical significance of plasma mutarotase levels in kidney disease. 2 seniors; 8-week elective periods. School of Medicine. (September–May)

280 **Research in Experimental Atherosclerosis** (10) Bailey
Study of factors influencing the development and course of atherosclerosis in rabbits. 2 seniors; 8-week elective periods. School of Medicine (September–May)

281 **Research in Biochemistry of Carbohydrates and Enzymes** (10) B. Smith
Research in a problem already under investigation in the Department or a project in related fields suggested by the student. 2 seniors; 8-week elective periods. School of Medicine (September–May)

282 **Research in Biochemistry of Lipid Metabolism and Transport** (10) Vahouny
Biochemical investigation of a clinical problem involving lipids of special interest to the student, or participation in existing research program in the

Department. 2 seniors; 8-week elective periods. School of Medicine (September–May)

283 **Research in Metabolic Regulation within the Heart** (10) Vahouny

Studies on metabolic regulation and effects of drugs. 2 seniors; 8-week elective periods. School of Medicine (September–May)

286 **Research on Transfer RNA and Protein Biosynthesis in Normal and Tumor Cells** (10) R.C. Gallo*

Investigative work on isolation and purification of RNA fractions and function in protein synthesis in cell-free systems from normal and tumor cells. 2 seniors; 8-week elective periods. National Cancer Institute (September–May)

287 **Research in Biochemistry of B_{12} Coenzymes** (10) Walker

Research in a problem under investigation in the Department. 2 seniors; 8-week elective periods. School of Medicine (September–May)

290 **Extramural Biochemistry Elective** (arr.)

The Department arranges for medical students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

295 **Research in Biochemistry** (arr.) Staff

For 1st- and 2nd-year medical students and for graduate students. Participation in a project under investigation in the Department or one in a related field suggested by the student and approved by the Staff. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Child Health and Development

Chairman: R.H. Parrott

Associate Chairmen: A.M. Margileth *(Student Affairs)*, D.W. Delaney *(House Staff and Medical Care)*, J.G. Randolph *(Surgical Division)*, J.C. Houck *(Research)*

Directors of Divisions: Gordon Avery *(Neonatology)*, M.J. Malone *(Neurology and Neurosurgery)*, M.M. Parks *(Ophthalmology)*, D.W. McKay *(Orthopaedics)*, J.L. Levine *(Otolaryngology)*, D.W. Delaney *(Pediatric Medicine)*,

*Dr. Gallo is Senior Investigator at the National Cancer Institute.

Gloria Eng *(Physical Medicine and Rehabilitation)*, R.S. Lourie *(Psychiatry)*, J.M. LoPresti *(Radiology)*, J.G. Randolph *(Surgery)*

Professors R.S. Higdon, J.P. Adams, R.S. Lourie, J.G. Randolph, R.H. Parrott, Spyros Doxiadis *(Visiting)*, S.L. Leiken, J.C. Houck *(Biochemistry)*, A.M. Margileth, M.J. Malone, Gordon Avery, D.W. Delaney, Wellington Hung, L.P. Scott III, R.M. Chanock, D.W. McKay

Clinical Professors W.S. Anderson, L.E. Hoeck, W.A. Howard, J.A. Washington, Lois Murphy, Sydney Ross, William Stark, M.M. Parks, J.D. Noshpitz *(Psychiatry)*

Professorial Lecturers R.B. Scott, P.B. Hammond

Associate Professors Margaret Gutelius, Leon Cytryn *(Psychiatry)*, J.E.McClenathan, Rebecca Rieger *(Research)*, L.W. Perry, H.B. Richardson, Jr., Gloria Eng, Mervyn Elgart, Ann Barnet, T.H. Milhorat, Karin Nelson

Associate Clinical Professors J.J. McFarland, Jr., T.E. Reichelderfer, S.I. Wolf, A.B. Coleman, Bennett Olshaker *(Psychiatry)*, Belinda Straight *(Psychiatry)*, G.J. Cohen, J.J. Francis *(Psychiatry)*, A.F. North, Jr., Iradj Mahdavi, Isabella Bourne, J.P. Keeve, A.J. Modlin, P.C. Brunschwyler, F.C. Green

Assistant Professors J.R. Puig, Nasser Movassaghi, C.A. Rigg, G.P. August, M.W. Werthmann, Jr., C.D. Brandt *(Microbiology)*, H.W. Kim, Anne Fletcher, Marilyn Renfield, Jane Todaro, R.P. Altman, D.S. Friendly, Jocelyn Hicks, M.N. Ozer *(Research)*, Karen Olness, M.M. Platt

Assistant Clinical Professors J.L. Levine, R.E. Martin, I.D. Milowe, J.H. Peacock, Jr., Mary Sartwell, C.F. Stiegler, H.G. Clark, Adrian Recinos, Jr., C.R. Webb, Stephen Mourat *(Psychiatry)*, Erwin Friedman *(Psychiatry-Psychology)*, A.E. Marans *(Psychiatry)*, Elma Denham *(Psychiatry)*, M.S. Glatt *(Psychiatry)*, D.H. McKnew, Jr. *(Psychiatry)*, L.A. Cove, D.P. Devaris *(Psychiatry)*, Milton Engel *(Psychiatry)*, H.T. Yates, Mary Fox, H.D. Knox, B.H. Ong, H.R. Gold, V.L. Guandolo, J.L. Chamberlain III, Leonard Lefkowitz, J.G. Chopra, S.G. Werner, A.B. Zients *(Psychiatry)*, G.W. Hardman, Jr., G.A. Balfour, D.G. Albert, B.M. Webb, Virginia Ingram, G.W. Mella, G.A. Tripp, Michael Brody, J.L. Hatleberg, K.L. Kaplan, Robert Shearin, Eduardo Azcarate *(Psychology)*, S.I. Granger, S.L. Levin, F.A. Pedreira, Thomas Sullivan, Lovisa Tatnall, Edith Taylor, Stanley Greenspan

Instructors Beneta Peacock, Sylvia Wooten, Cecilin Chisholm, Helmut Brunner *(Research)*, Mario Ortega, Ramesh Desai *(Research)*, D.A. Davis *(Research)*, P.B. Cohen, Annette Heiser, R.D. Landes, B.J. Lloyd *(Research)*

Clinical Instructors H.H. Diamond, R.H. Mitchell, R.O. Warthen, Emilie Black, R.H. Anderson, W.G. Preisser, S.Z. Goldblatt, Hilary Millar *(Psychiatry)*, Harold Plotsky *(Psychiatry)*, Jean Lockhart, H.W. Rice, D.A. Young, George Joseph, R.M. Zakheim, M.L. Feldman, Lillian Osborne *(Psychiatry)*, Manouchehr Rokni, H.J. Steinfeld, S.L. Kaplan *(Psychiatry)*, Mary Flumerfelt *(Psychiatry)*, D.R. Meers *(Psychiatry)*, B.S. Bruner, M.D. Waters, M.E. Lederman, M.E. Bravo, G.W. Daisley, Jr., K.G. Kassebaum, Frances Min, Agnes Schweitzer, Sirus Amiri, Viola Cheng, Vichitur Chusuei, Thomas Frey, M.J. Guralnick *(Psychology)*, Annop Tantisunthorn, J.M. Burgin, Khawla Al-Abbousi

Special Lecturers J.A. Bottiglione, C.J. Schulte III, J.W. Oberman, E.V. Soto, R.F. Hinckley, Susan Fisher, C.M. Berlin, Jr., Morris Feitel, M.I. Mones, Caroline Chandler, R.S. Chandra, Lucas Kulczycki, Marianne Schuelein, S.L. Blumenthal, J.A. Kenney, Jr., M.I. Michael, B.J. Walsh

*303 **Pediatric Clerkship** (10) Margileth

Full-time, as part of resident team; ward rounds; work in outpatient department and specialty clinics under staff supervision; child psychiatry and child guidance, lectures, clinical conferences, grand rounds. Children's Hosp. (Annual, continuous 8-week rotation)

376 **Pediatric Neurology** (5 or 10) Malone, Platt, K. Nelson

Participation in diagnostic and therapeutic studies on inpatients and outpatients. Rounds, conferences, seminars. 2 seniors; 4- or 8-week elective periods. Children's Hosp. (September–May)

377 **Community Health Development** (5 or 10) Hinckley

Public health preventive and community medicine as it is conducted by the Health Department of Montgomery County, Maryland. Opportunity to work in outlying health center satellites, central pediatric specialty clinics, and to become familiar with school health programs and projects. 1 senior; 4- or 8-week elective periods. (September–May)

379 **Child Development—Community Applications** (5) Richardson

(Formerly Developmental Neurology)

Application of child development principles in young school-age children. The course is conducted by the staff of Program for Learning Disorders. Students will work in elementary schools, special education facilities, and hospital clinics. 2 seniors; 4-week elective periods. (September–May)

380 **Clinical Pediatrics** (5) Margileth, Puig, Todaro

Full-time, as part of resident team; wards, outpatient department, and specialty and emergency clinics under staff supervision. Participation in diagnostic studies, therapeutic procedures, rounds, and conferences. 6 seniors; 4-week elective periods. Children's Hosp. (September–May)

381 **Pediatric Allergy** (10) Howard

Introduction to pediatric allergy, clinics and wards, some experience in experimental techniques and preparation of extracts. 1 senior; 8-week elective periods. Children's Hosp. (September–May)

382 **Pediatric Radiology** (5) LoPresti

Diagnostic and therapeutic radiology, special diagnostic procedures. 2 seniors; 4-week elective periods. Children's Hosp. (September–May)

384 **Newborn and Premature** (5) Renfield

Principles and practices of neonatology, emphasizing basic physiological processing, and their relationship to normal development and to diseases in the newborn period. 2 seniors; 4-week elective periods. Univ. Hosp. (September–May)

385 **Child Psychiatry** (5) Cove

Diagnostic and follow-up studies on inpatients and outpatients; rounds, conferences, seminars; visits to related community facilities. 2 seniors; 4-week elective periods. Hillcrest Children's Center (September–May)

386 **Pediatric Hematology** (5) Leikin, Movassaghi

Clinical and laboratory studies of infants and children with hematologic disorders; bone marrow examinations. 1 senior; 4-week elective periods. Children's Hosp. (September–May)

*Required for medical students.

Soto

387 **Clinical Pediatrics** (5)

Care of newborn and children on inpatient basis; diagnostic studies, therapy; assigned reading. 2 seniors; 4-week elective periods. Fairfax Hosp. (September–May)

Avery, Fletcher

388 **Newborn Medicine** (5)

Observation and participation in the care of inpatient and outpatient infants. 1 senior; 4-week elective periods. Children's Hosp. (September–May)

Scott, Perry

389 **Pediatric Cardiology** (5)

Physical diagnosis of congenital and acquired heart diseases, interpretation of electrocardiograms and vectorcardiograms, cardiac catheterizations. 2 seniors; 4-week elective periods. Children's Hosp. (September–May)

390 **Extramural Pediatric Elective** (arr.)

The Department arranges for students to spend elective periods at other institutions. Interested students should contact Dr. Andrew Margileth.

Houck

391 **Cell Biology Research** (5 or 10)

Biochemical studies of normal and diseased human cells in culture. 2 seniors; 4- or 8-week elective periods. Children's Hosp. (September–May)

Rigg

392 **Adolescent Medicine Clerkship** (5 or 10)

Study of the normal developmental problems of adolescence. Experience in the medical care of adolescents. 2 seniors; 4- or 8-week elective periods. Children's Hosp. (September–May)

Hicks, Chandra

394 **Pediatric Anatomical Pathology and/or Clinical Pathology** (5)

Participation in necropsy and surgical pathology service. Clinical correlation of histopathology, laboratory studies, and clinical disease. 1 senior; 4-week elective periods. Children's Hosp. (September–May)

Cytryn, Friedman

396 **Mental Retardation** (5 or 10)

Diagnostic work-up of mentally retarded children and adolescents. Conferences, community resources. 2 seniors; 4- or 8-week elective periods. (September–May)

Hicks, Margileth

397 **Pediatric Clinical Laboratory** (5)

Laboratory studies of infants and children correlated with clinical disease. In-depth review of laboratory diagnostic studies. 1 senior; 4-week elective periods. Children's Hosp. (September–May)

Oberman, Ortega

398 **Comprehensive Care** (5 or 10)

Participating in both sick- and well-child care as administered in a comprehensive setting; experience in multidisciplinary approach; cooperative planning with other community agencies. 1 senior; 4- or 8-week elective periods. Comprehensive Health Care Program (September–May)

Clinical Engineering

Chairman: W.S. Yamamoto

Professors W.S. Yamamoto, H.V. Pipberger, Bruce Waxman *(Research)*, R.D. Squires
Associate Professor J.C. Aller
Associate Professorial Lecturer G.B. Devey
Assistant Professors C.D. Batchlor *(Research)*, Alan Berson *(Research)*, Rosalie Dunn *(Research)*, Hanna Pipberger *(Research)*
Assistant Clinical Professor H.A. Haessler
Instructors F.H. Orthner, U.E. Ruttimann

351 **Medical Engineering for Medical Students** (10) Staff

Students will be assigned to a biomedical engineer for tutorial instruction in the principles and practices of clinical engineering. Participation in current laboratory projects, assigned reading and study. Participation in the Health Care Technology Seminar is required during the period of the elective. Students should have some basic knowledge of mathematics or physics, or some prior exposure to engineering disciplines. Consultation with the staff is required prior to enrollment. 2 seniors; 8-week elective periods. Warwick Bldg. (September–May)

353 **Medical Computing** (10) Staff

(Formerly Electronics and Computers)

Aspects of computer usage including the preparation and execution of programs which involve clinical or research applications, such as ECG analysis, pulmonary function calculation, medical file management, mathematical modeling, data processing, and managerial computing. In some cases, the staff may be able to supervise a student in an area of his choice; in general, however, the program will consist of formal classroom instruction as well as individual study. Participation in the Health Care Technology Seminar is required during the period of the elective. 6 seniors; 8-week elective periods (may be taken in two divided 4-week periods). Warwick Bldg. (September–May)

354 **Automated Medical Measurement Systems** (10) Staff

Under supervision, the student will work in the daily operation of a multiphasic screening clinic and participate in the process of new implementations and in evaluation of the system. Review of variability of clinical findings and the problems of the variability of clinical observation. Participation in the Health Care Technology Seminar is required during the period of the elective. 2 seniors; 8-week elective periods. Warwick Bldg. (September–May)

390 **Extramural Clinical Engineering Elective** (arr.) Staff

The Department arranges for students to spend one or more elective periods at other institutions. Interested students must have the approval of the Chairman of the Department.

Clinical Sciences

SUBCOMMITTEE ON INTRODUCTION TO CLINICAL SCIENCES

N.T. Tsangaris *(Chairman)*, H.M. Grigorian, A.M. Margileth, T.E. Piemme, Benny Waxman

Clinical Sciences, an interdisciplinary program, is required of medical students in the fourth semester. By means of panel discussions, tutorials, case presentations,

demonstrations, and examinations of patients, it provides students with basic instruction in the various clinical subjects and prepares them professionally and personally for the clinical clerkships and career electives of the third and fourth years. The program is coordinated by a Subcommittee of the Committee on Education Policy of the School of Medicine. The Subcommittee consists of members from the departments responsible for teaching the course. Staff

*301 **Introduction to Clinical Medicine** (16)

An integrated, organ-oriented, interdepartmental course providing fundamental instruction in anesthesiology, child health and development, dermatology, gynecology, internal medicine, neurology, obstetrics, ophthalmology, psychiatry, radiology, and surgery. Emphasis on physical diagnosis and laboratory medicine. Includes Life Cycle, dealing with the interpersonal relationships of the physician and his patients and their families. (Spring)

Dermatology

Chairman: R.S. Higdon

Professor R.S. Higdon
Associate Professor Mervyn Elgart
Associate Clinical Professors W.M. Narva, W.R. Vineyard, George Skipworth
Assistant Clinical Professors C.S. Brown, Manuel Landman, P.L. Repetto, Jr., Donald Mitchell, L.J. Eanet, Maria Turner
Clinical Instructors Phyllis Huene, H.S. Golomb, Ronald Goldner
Special Lecturers Gerda Landman, Naomi Kanof, J.A. Kenney, Jr.

380 **Dermatology Clinic** (5) Vineyard

Conferences, lectures, and attendance at Dermatology Clinic where patients with wide variety of dermatoses are seen. Diagnosis and treatment of common skin disorders. Dermatologic surgical procedures, technique for using liquid nitrogen, culture and identification of fungi, microscopic diagnosis of common cutaneous diseases. 2 seniors; 4-week elective periods. Walter Reed Gen. Hosp. (September–May)

381 **Dermatology Clinic** (5) Goldner

Same as Derm 380. 1 senior; 4-week elective periods. Andrews Air Force Base Hosp. (September–May)

382 **Dermatology Clinic** (5) Higdon

Same as Derm 380. 1 senior; 4-week elective periods. Univ. Clinic (September–May)

383 **Dermatology Clinic** (5) Narva

Same as Derm 380. 1 senior; 4-week elective periods. Nat'l. Naval Medical Center (September–May)

384 **Private Office Practice** (5) Repetto

1 senior; 4-week elective periods. (September–May)

* Required for medical students.

385 **Private Office Practice** (5) Eanet

1 senior; 4-week elective periods. (September–May)

386 **Dermatology Clinic** (5) Mitchell

Same as Derm 380. 1 senior; 4-week elective periods. Group Health Asso., Inc. (September–May)

390 **Extramural Dermatology Elective** (arr.)

The Department arranges for students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

Epidemiology and Environmental Health

Chairman: J.W. Millar

Professor J.W. Millar
Associate Professor C.R. Hartman
Associate Clinical Professors W.J. Zukel, L.S. Jaffe
Assistant Professors E.N. Kassira, Yousef Al-Doory, F.L. Hurley *(Biostatistics)*
Assistant Clinical Professors Lawrence Pyle, Jr., John Vinyard, Jr.
Assistant Professorial Lecturers S.H. Barboo, Jr., N.E. Manos, J.A. Lee, Olga Joly, D.V. Lassiter

*201 **Introduction to Epidemiology and Environmental Health** (2) Millar and Staff

For medical students; open to qualified graduate students. Principles and methodology of epidemiology and biostatistics. Ecological approach to health and disease, including parasitology and mycology. (Spring)

217 **Clinical Mycology** (2 or 4) Al-Doory

Study of clinical aspects of mycotic diseases; emphasis on diagnosis of disease and identification of etiologic agents. (Fall)

218 **Medical Parasitology** (1 or 2) Millar and Staff

For medical students; open to qualified graduate students. Study of host-parasite relationships. Clinical recognition of the important parasites in medicine. (Fall)

219 **Malariology** (1) Kassira and Staff

The general principles of the diagnosis, life cycle, pathogenicity, treatment, and prevention of malaria. Prerequisite: Epid 201 or equivalent. (Fall)

230 **Biostatistics** (2 or 4) Hurley, Manos

Introduction to statistical analysis, theory of measurements and distribution, including significance testing, basic concepts of probability and association, sampling techniques, design of experiments, and introduction to computers. (Fall and spring)

*Required for medical students.

239 **Introduction to Computer Applications in Health Sciences—FORTRAN** (1) Millar and Staf

Orientation to the use of large computers in a medical environment. Us of FORTRAN, a computer independent language, for the solution o simple computational tasks. (Fall and spring)

240 **Computer Applications in Health Sciences—PL/1** (1) Millar and Staf

Introduction to the use of PL/1 for the solution of advanced computa tional tasks. (Fall and spring) Staf

295 **Research in Epidemiology** (arr.)

Participation in experimental studies in infectious diseases and research in community medicine. Admission by permission of Department. (Fall and spring) Staf

299–300 **Thesis Research** (3–3) Staf

(Fall and spring)

301 **Applied Epidemiology** (2)

(Formerly Epidemiology and Environmental Health)

Lectures, seminars, and case studies. Epidemiological solutions to healt problems of the community. (Fall and spring) Staf

351 **Global Epidemiology** (1)

For medical students; open to graduate students by arrangement. Geo graphic pathology of disease and international aspects of disease pre vention and control, including world demographic problems. (Fall Hurle

352 **Seminar: Experimental Epidemiology** (2)

For medical students; open to graduate students by arrangement. Studen participation in definitions, design, and methods for developing epidemi ologic studies of diseases. Prerequisite: Epid 230 or permission o instructor. (Fall) Staf

353 **Military Preventive Medicine** (1)

Operational medicine, environmental and sanitation problems, epidemio logic diseases of military importance and their prevention and control Medical aspects of aerospace and submarine medicine. 2nd-year medica students. (Fall) Lee and Staf

354 **Seminar: Human Ecology** (1)

Ecology—man within the framework of reference—physical and cul tural anthropology, geography, sociology, urban planning, public health and public administration. (Fall) Jaffe, Millo

356 **Introduction to Environmental Health** (3)

A survey of organizations, function, current practices, and federal, state and local regulations to control the environment. (Spring) Staf

380 **Methods in Public Health** (5 or 10)

Rotation through all divisions, including mental health, maternal and child health, environmental medicine, communicable diseases; field trips

15 seniors; 4- or 8-week elective periods. D.C. Dept. of Human Resources (September–May)

382 **Clinical Practice of Public Health** (10) Staff

Application of ecological approach to problems of community health; emphasis on comprehensive care. Field experiences on such current issues as drug abuse, family planning, specific health needs of the aged, and other problems affecting delivery care systems. Seniors; 8-week elective periods. D.C. Dept. of Human Resources (September–May)

384 **Research in Public Health** (10) Staff

Supervised research; the student selects the topic from a broad range of public health problems, including mental health, maternal and child health, environmental medicine, epidemiological methods, biostatistics. 1 senior; 8-week elective periods. D.C. Dept. of Human Resources (September–May)

385 **Studies in Cardiovascular Disease** (5) Zukel

Participation in one or more current studies at the National Heart and Lung Institute; selection by the student. 2 seniors; 4-week elective periods. (February 25–March 24)

387 **Diseases of the Tropics** (5 or 10) Staff

Diagnosis, treatment, epidemiology, and laboratory aspects of exotic diseases; experience in the delivery of health care in the tropics. 1 senior; 4- or 8-week elective periods—to be arranged.

390 **Extramural Epidemiology Elective** (arr.)

The Department arranges for medical students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Medical and Public Affairs

Chairman: Murdock Head

Professor Murdock Head
Professorial Lecturers R.D. Cotton, Thomas Bryant
Associate Professor David Weeks

351 **Forensic Medicine** (2) Sharpe*, Head

Open to 2nd-year medical students. Examples drawn from the range of problems arising when the professional interests of lawyers and physicians overlap. Problem contexts include malpractice, personal injury

*Dr. Sharpe is Professor of Law in the University's National Law Center.

litigation, licensure and discipline, ethics and economics, hospitals and other institutions of practice, and compelled treatment. (Fall)

Bryant, Cotton

352 **Issues in Health Care** (1)
Contemporary health problems, such as poverty medicine, drug abuse, health care delivery, and environmental health; physician's role in effort to resolve these problems. Lectures; staff use of neighborhood clinics, recent publications, and administrators of government programs headquartered in Washington. (Spring)

Medicine

Chairman: W.N. Jensen
Associate Chairman: G.A. Kelser, Jr.
Directors of Divisions: Halla Brown *(Allergy)*, G.A. Kelser, Jr. *(Cardiology)*, W.O. Dobbins III *(Gastroenterology)*, T.E. Piemme *(General Medicine)*, L.S. Lessin *(Hematology-Oncology)*, L.K. Alpert *(Metabolic and Endocrine Diseases)*, D.J. Massaro *(Pulmonary Diseases)*, J.P. Naughton *(Rehabilitation Medicine)*, A.E. Parrish *(Renal Diseases)*, W.R. Felts, Jr. *(Rheumatology)*

Professors M.J. Romansky, L.K. Alpert, J.M. Evans, C.S. Tidball *(Research)*, A.E. Parrish, F.W. Wolff, Halla Brown, Irene Tamagna, J.J. Feffer, W.N. Jensen, T.E. Piemme, T.C. Chalmers, Leon Bernstein, J.P. Naughton, G.A. Kelser, Jr., J.D. Chase, S.M. Fox III, H.V. Pipberger, H.J. Zimmerman, J.A. Curtin, Milton Corn, D.J. Massaro, R.P. Kaufman, Tsung O. Cheng, Joseph Lindsay, Jr., R.J. Bulger, J.R. Hogness, Fred Leonard *(Research—Rehabilitation Medicine)*

Clinical Professors A.G. Prandoni, J.J. Rheingold, T.S. Sappington, A.B. Rosenbaum, T.J. Greenwalt, Benjamin Manchester, L.E. Putnam, M.H. Stolat, C.W. Thompson

Associate Professors W.R. Felts, Jr., Irene Hsu, Ariel Hollinshead *(Research—Pharmacology)*, N.C. Kramer, J.K. Viktora *(Research—Biochemistry)*, J.C. Penhos *(Research—Endocrinology)*, J.B. O'Connell, Lawrence Pierce, W.O. Dobbins III, K.L. Becker, J.M. Bacos, J.D. Finkelstein, K.M. Stevens, Mahmoud Mourad, L.S. Lessin, A.F. Mastellone *(Physical Medicine)*, O.S. Selawry, Karl Wipplinger, Gloria Eng, V.T. DeVita, Michael McCally, P.A. Gorman, S.H. Danovitch, J.C. Rios, W.F. Barth, James Stengle

Associate Clinical Professors Joseph Ney, J.W. Latimer, Jr., S.J.N. Sugar, H.D. Ecker, C.W. Jones, E.S. Gladsden, Maurice Mensh, F.J. Murray, E.P. Parker III, M.H. Rosenberg, Milton Gusack, Jack Kleh, H.M. Silver, J.P. Mann, Edward Adelson, R.R. Belton, S.D. Loube, Arthur Ruskin, C.A. Rosenberg, H.E. Ticktin, L.J. Thomas, W.O. Bailey, Jr., Ruth Benedict, S.W. Kirstein, Israel Kessler, W.D. Brill, Marvin Fuchs, C.A. Schulman, Alfred Baer, Bertel Nelson, J.M. Pisani, S.W. Bush, Joseph King, M.H. Jacobson, J.P. Nasou, Raymond Standard, Henry Simmons, E.J. Leonard, Joseph Fenton *(Clinical Psychology)*, Peter Birk

Assistant Professors F.A. Peck, T.R. Shworles *(Research—Social Psychology)*, Philip Witorsch, J.K. Cooper, P.M. Berkman, J.R. Shapiro, Robert Keimowitz, C.H. Chan, John LaRosa, D.H. Goodman, Geraldine Schechter, W.S. Chiu, S.A. Schroeder, M.H. Cohen, W.P. Fortune, H.H. Hansen, Gloria

Massaro *(Research—Pulmonary Diseases)*, J.F. Meyer, D.S. O'Leary, P.O. Periman, K.J. Dickie, R.J. Karpick, P.M. Kini, J.R. Whiteman *(Research)*, Joan Postow, Anne Thompson, Karen Olness, Tali Bashour, G.M. Gacad, R.A. Goldstein, P.P. Klug, R.A. Nicklas, R.A. Noble, J.V. Russo, Barbara Sherwin, S.V. Spagnolo, Jean Vazuka, J.M. Wise *(Allied Health)*, Riaz Haider *(Research)*, Philip Assatourians

Assistant Clinical Professors David Horwitz, S.T. Gibson, M.H. Rose, Adolph Friedman, J.W. Long, T.L. Hartman, Boris Rabkin, L.A. Craig, Jr., A.W. Danish, Alvin Seltzer, C.E. Law, Sr., E.L. Rea, Conrad Gossels, H.O. Mott, N.H. Rubenstein, W.L. Stone III, B.H. Ostrow, W.R. Ehrmantraut, G.A. Chapman, F.M. Gross, Silas Babin, Jr., Alice Brigham, Jack Crowell, D.S. Davis, J.H. Epstein, F.K. Harris II, R.F. Dyer, E.H. Bauersfeld, William Lewis, H.I. Passes, C.W. Foulke, A.A. Lear, O.W. Donnelly, R.S. Poole, H.C. Sadin, S.J. Talpers, W.L. Hall, Raymond Scalettar, M.A. Sislen, G.C. Buchanan, G.T. Economos, Irwin Ardam, S.E. Barr, H.A. Moskovitz, J.T. Hagenbucher, G.N. Polis, W.F. Morrissey, R.A. Apter, Jean Lucas, B.R. Cooperman, Francis Chucker, R.S. Wilkinson, W.E. Gallinek, L.H. Biben, W.H. Harvey, William Kurstin, Dorothea Chapman, L.H. Fenton, Paul Schlein, D.J. Hand, P.A. Haber, D.M. Kessner, M.S. Wolfe, C.H. Oliver, Jr., W.T. Moore, D.A. Morowitz, Guiseppe Balsamo, G.J. Thorpe, A.B.C. Knudson, N.L. Christopher, R.B.W. Smith, G.H. Coffey, G.H. Nachnani, R.A. Fischer, Bernard Grand, R.M. Kaufman, A.L. Ginsberg, M.J. Stern, Phillip Toskes, Cesar Rudzki, R.A. Giannella, P.O. Woolley, Jr., H.C. Singer, E.B. Thompson, Richard Schoenfeld, N.P. Trujillo, P.R. Lenz, M.M. Shefferman, L.M. Weiss, A.M. Mondzac, R.K. Sarin, Daniel Ein, Frederick Rickles, S.J. Wolin, T.A. Bensinger, J.P. Gockerman, B.K. Singh

Instructors S.H. Mendelson, Atin Guha, P.F. Poblete, P.B. Cohen, W.Y.K. Goo, C.L. Griffin, G.G. Phelps *(Allied Health)*

Clinical Instructors N.K. Bohrer, N.G. Goodman, J.D. Herman, Frederick Meyers, Lily Ruckstuhl, C.U. Shilling, Robert Kramer, F.J. Borsody, M.J. Halberstam, D.W. Datlow, R.M. Huffman, L.P. Appel, M.A. Herman, R.O. Knox, R.W. Turner, S.A. Schwartz, Andree Thomas, Marvin Schneider, Harris Kenner, G.A. Tralka, L.F. Barker, D.D. Haut, Isaac Weiszer, A.J. Anderson, P.G. Rochmis, J.F. Mermel, Paul P.L. Chang, N.T. Connally, J.C. Perkins, H.J. Alpert, P.V. Holland, Leo Janis, R.A. McConnaughy, S.R. Rishi, Israel Spector, B.G. Vlalukin, Devanhalli Ramaswamy, Dorothy Millon, Hoyoko Yahanda, Manoochehr Pooya, Lawrence Klein, H.R. Birschbach, Martin Greenfield, Kenneth Joslyn, Raymond Matta, H.S. Mirsky, D.S. Oyer, L.G. Pawlson, Bryan Arling, K.H. Rand, P.E. Cohart, J.B. Crandall, M.A. Newman, S.N. Richman, M.W. Graf, J.M. Cohen, Frank McGrew III, N.A. Crane, M.S. Drapkin, G.C. Fareed, N.S. Otchin, John Stoner III, M.M. Gottesman, J.W. Benson, Jr., S.F. Stein

Special Lecturers Sol Katz *(Pulmonary Diseases)*, R.W. Berliner *(Renal Diseases)*, Albert Sjoerdsma *(Internal Medicine)*, D.S. Fredrickson *(Internal Medicine)*, W.C. Roberts *(Cardiology)*, Martin Shargel

*305 **Inpatient Clerkship** (15) Staff

Training in comprehensive study of patients; history and physical examination; ward rounds, consultations, conferences, preceptorial teaching, seminars. V.A., D.C. Gen., Univ. hosps., and Wash. Hosp. Center (12-week periods throughout academic year)

*Required for medical students.

Staff

*308 **Outpatient Medicine and Emergency Room** (10)
Care of ambulatory patients and emergency cases under close supervision. Daily clinics in general medicine and various specialties; conferences on current cases. Univ. Clinic and Hosp. Emergency Room (8-week periods throughout the academic year)

LaRosa

311 **Rehabilitation of Teenage Drug Offenders** (1)
Students participate one evening a week in the youth rehabilitation program of the Narcotics Treatment Administration of the District of Columbia. Students encouraged to establish communication with one or two addicts and to investigate in depth factors that led them to addiction. Seminars dealing with various aspects of drug abuse held on alternate Saturday mornings. Limited to 10 students. (Fall)

Brown

320 **Experience in Allergy** (10)
Clinical experience in allergy. 2 seniors; 8-week elective periods. Univ. Clinic (September–May)

Brown

323 **Impact of the Inner-city Environment on Asthma** (5 or 10)
Each student is assigned one or two patients. Under the guidance of an internist or psychiatrist, student takes care of the patient medically and allergically and studies his psychodynamics. With the patient, the student visits the patient's home and family and areas the patient finds stressful (welfare office, food stamp office, court of law, public housing office, Neighborhood Legal Services, etc.) 2 seniors; 4- or 8-week elective periods. Univ. Clinic (September–May)

Brown

326 **Research: Allergy** (10)
Research in clinical or experimental allergy or related field. 1 or 2 seniors; 8-week elective periods. Univ. Clinic (September–May)

Corn

331 **Acting Intern in Medicine** (5)
Each student is assigned to a patient-care ward team and assumes basic responsibility, under supervision of a resident and the attending physician, for the management of approximately six patients. The student functions as an intern (however, all written orders must be countersigned). Participation in case presentation and scheduled conferences. 2 seniors; 4-week elective periods. D.C. Gen. Hosp. (September–May)

Zimmerman

334 **Acting Intern in Medicine** (5 or 10)
Student functions as an intern on the general medical wards, under supervision of a rotating resident. With the resident, he is responsible for work-up, diagnosis, and management of patients. Student will present his patients during attending rounds and house staff conferences. 5 seniors; 4- or 8-week elective periods. V.A. Hosp. (September–May)

Apter

335 **Inpatient Medicine** (5)
Participation in diagnostic studies and clinical management of bed patients. Teaching rounds, conferences. 4 seniors; 4-week elective periods. Fairfax Hosp. (September–May)

Curtis

337 **Inpatient Medicine** (5)
Assignments to Medical Intensive Care Unit; ward rounds, conferences, reading assignments. 2 seniors; 4-week elective periods. Wash. Hosp. Center. (September–May)

* Required for medical students.

340 **Ambulatory Health Care** (10) Piemme

Participation in community health program, including the University Clinic, University Hospital Emergency Room, a Home Care Program, and a transportation system. Students are involved in all facets of the program. Each student is expected to study a specific element of the system with respect to its effect on the capacity to deliver health care within a community. Exchange with similar programs in other universities is possible for students who elect more than the 8-week minimum. Conferences, reading assignments. 2 seniors; 8-week elective periods. Univ. Hosp. (September–May)

342 **Narcotics Abuse** (10 or 15) LaRosa

Student is assigned a project in the narcotics treatment program of the District of Columbia and works with Dr. LaRosa and Dr. Robert Dupont, Director of the D.C. Narcotics Treatment Administration (NTA). Projects are individualized and may range from intensive experience in the NTA therapeutic communities to the evaluation of the impact of methadone maintenance on narcotics abuse in the District of Columbia. 1 senior; 8- or 12-week elective periods. NTA (September–May)

345 **Family Practice Preceptorship** (5) Anderson*

Preceptorship in small urban community family practice. 1 senior; 4-week elective periods. Waynesboro, Va. (September–May)

352 **Clinical Cardiology** (10) Hsu and Staff

Training in clinical cardiology based on the needs and desires of the individual student. The following choices are available: inpatient and office-patient care, experience in the Coronary Care Unit, Peripheral Vascular Laboratory, Cardiac Rehabilitation, interpretation of electrocardiograms and vectorcardiograms in the Heart Station (this rotation can also include experience in graphic techniques such as phonocardiography and apexcardiography), work in the exercise ECG Laboratory, participation in hypertensive studies, a period in the Cardiac Catheterization Laboratory, and whenever possible a study project. 4 seniors; 8-week elective periods. Univ. Hosp. (September–May)

358 **Introduction to Cardiology** (5) Bacos, Mendelson

Participation in clinical cardiology, correlating the bedside approach to cardiovascular diagnosis with special diagnostic studies, including phonocardiography, atrial electrocardiography, cardiac catheterization, and angiocardiography, etc. 1 senior; 4-week elective periods. Wash. Hosp. Center (September–May)

359 **Introduction to Acute Coronary Care** (5) Bacos, Mendelson, Russo

Emergent approach to acute myocardial infarction including anatomy of the coronary tree and physiology of coronary circulation, physical diagnosis of the complications of infarction, theory and indications for pacemaker insertion, and electrocardiographic monitoring and acute myocardial infarction. 1 senior; 4-week elective periods. Wash. Hosp. Center. (September–May)

360 **Clinical Cardiology** (5 or 10) Fletcher†

Under supervision, the student is responsible for reading electrocardiograms, consulting on cardiovascular problems, and participating in

*Dr. Anderson is in private practice in Waynesboro, Virginia.
†Dr. Fletcher is Chief of Cardiology at the Veterans Administration Hospital.

various cardiac catheterization and angiographic procedures. Experience in cardiac fluoroscopy, introduction to vectorcardiography. Teaching rounds three times weekly; two weekly courses, one in auscultation, one in electrocardiography. 2 seniors; 4- or 8-week elective periods. V.A. Hosp. (September–May)

Franciosa*

363 **Cardiac and Medical Intensive Care** (10)

Student has the opportunity (1) to manage cardiac emergencies, treat arrhythmias, use cardioversion, and become familiar with all aspects of acute cardiac care; (2) to manage medical emergencies ranging from diabetic ketoacidosis to hypoglycemia, from uremia to hepatic coma; and (3) to receive training in the modern therapy of respiratory failure. Included are the use of mechanical ventilators, oxygen therapy, and management of respiratory acid-base problems. 2 seniors; 8-week elective periods. V.A. Hosp. (September–May)

L. Alpert

370 **Endocrinology and Cancer Chemotherapy** (5)

Clinical work; emphasis on endocrinology (and metabolism) or cancer chemotherapy, depending on student's choice. 2 seniors; 4-week elective periods. Univ. Clinic (January 28–March 24)

Shapiro

371 **Endocrinology** (5)

Student evaluates patients referred to the Endocrinology Service, takes part in planning diagnostic work-ups or therapy programs, and is responsible for case presentations of patients he has worked up. Exposure to techniques used in the endocrinology laboratory, such as protein binding determinations and radio-immuno assay of hormones; participation in Journal Club 4 mornings a week and in weekly conferences. The student is expected to assume prime responsibility for directing patient evaluations. 1 senior; 4-week elective periods. Wash. Hosp. Center (January 28–May 19)

Becker

373 **Endocrinology and Metabolism** (5 to 15)

Clinical experience in endocrinology and metabolism. Students examine endocrine patients, make preliminary diagnoses, and assist in treatment. Clinical rounds twice weekly; weekly endocrine clinic, diabetic clinic, and Journal Club participation; frequent endocrine lectures; laboratory and research experience available. 1 senior; 4- to 12-week elective periods. V.A. Hosp. (September–May)

Penhos

376 **Metabolic Disorders in Diabetes** (5)

Intensive and practical studies of the technique to produce surgical, chemical, and hormonal diabetes. Participation in research on carbohydrate, protein, and lipid metabolism, insulin secretion in isolated organ perfusions. Seminars and participation in Journal Club, and discussions on the results obtained. 4 seniors; 4-week elective periods. V.A. Hosp. (September–May)

Penhos

381 **Research in Endocrinology** (5)

Participation in endocrine research, including laboratory experience, experimental surgery, biochemical methods, and *in vivo* and *in vitro* endocrine studies. Weekly seminars and discussions correlate experimental results with clinical observations. 4 seniors; 4-week elective periods. V.A. Hosp. (September–May)

* Dr. Franciosa is Director of the Medical Intensive Care Unit at the Veterans Administration Hospital.

385 **Biochemical Abnormalities in Disorders of Lipoprotein Metabolism** (15) LaRosa

Current research directed toward the biochemical purification of enzymes responsible for removing lipids from the plasma and a study of the possible relationship between induction of these enzymes and the progestional and estrogenic components of currently used birth control pills. Experience in the use of modern techniques of protein separation, including ultracentrifugation, electrophoresis, and chromatography; experience in handling radioactive isotopes. Clinical experience with patients who have hyperlipoproteinemia. 1 senior; 12-week elective periods. Nat'l. Heart and Lung Institute and Univ. Hosp. (September–May)

387 **Diabetes Research Laboratory** (15) Recant*

Emphasis on problems in the pathogenesis of diabetes. Experience in pancreas and liver perfusion, study of the mechanism of insulin secretion and the effect of insulin on the liver. Additional studies in human subjects to investigate portal vein insulin patterns as compared with peripheral insulin levels. Exposure to techniques such as immunoassay of hormones and their use in the diagnosis and management of endocrine disease. Weekly conferences. 2 seniors; 12-week elective periods. V.A. Hosp. (September–May)

390 **Extramural Internal Medicine Elective** (arr.)

The Department arranges for students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

391 **Clinical Oncology** (10 or 15) Selawry

Participation in clinical management of patients with carcinoma, including supportive measures and palliative therapy. 3 seniors; 8- or 12-week elective periods. V.A. Hosp. (September–May)

393 **Oncology** (10) DeVita

Experience in current methods in evaluation and treatment of lymphomas and other tumors, including a view of the broad spectrum of these diseases. Participation in patient care and laboratory studies of current research in clinical pharmacology, tumor kinetics, and *in vitro* marrow culture techniques. 2 seniors; 8-week elective periods. NIH (September–May)

394 **Cell Kinetics** (10 or 15) Selawry

Study in the Medical Oncology Section on the generation time and dividing pool of cancer *in vivo* before and during therapy. 3 seniors; 8- or 12-week elective periods. V.A. Hosp. (September–May)

397 **Clinical Pharmacology of New Antineoplastic Agents** (10 or 15) Selawry

Participation in study design, drug administration, day-to-day observations, and use of biochemical or other methodology for determination of drug uptake, metabolism, and excretion. 3 seniors; 8- or 12-week elective periods. V.A. Hosp. (September–May)

399 **Cellular Pharmacology** (10 or 15) Selawry

Determination of optimal concentration times, time factors, and elucida-

* Dr. Recant is Chief of the Diabetes Research Laboratory at the Veterans Administration Hospital.

tion of antineoplastic agents. 3 seniors; 8- or 12-week elective periods. V.A. Hosp. (September–May)

Hollinshead

402 **Research in Cancer Immunology** (10)

Laboratory experience with tests used to correlate cellular anti-tumor reactivity to solid tumors with the clinical course of the disease; experiments to investigate viral etiology of certain forms of cancer; study of fetal antigens and role in oncogenesis; cell membrane antigens specific for leukemia. 1 senior; 8-week elective periods. Warwick Bldg. (September–May)

Danovitch

411 **Clinical Gastroenterology** (5)

Experience in clinical gastroenterology; consultations and follow-up of patients. Presentation of patients at conferences; observations and diagnostic procedures, including endoscopy; review of histology of lesions of intestinal tract and liver. 1 senior; 4-week elective periods. Wash. Hosp. Center (September–May)

Dobbins

413 **Clinical Gastroenterology** (5 or 10)

Intensive clinical experience with patients who have digestive disease, including those of the gastrointestinal tract, liver, and pancreas. Patient consultations, teaching rounds, seminars. Joint conferences with surgery, pathology, and radiology emphasize the multidisciplinary approach in digestive diseases. 2 seniors; 4- or 8-week elective periods. Univ. Clinic. (September–May)

Finkelstein

414 **Clinical Gastroenterology—Hepatology** (10 or 15)

Students see patients referred to the Gastroenterology-Hepatology Section for consultation and are responsible for initial evaluation and the follow-up of these patients. Participation in all specialized procedures including various biopsy techniques and endoscopies. Teaching rounds, conferences, seminars. Student elects to concentrate in either gastroenterology or hepatology. 2 seniors; 8- or 12-week elective periods. V.A. Hosp. (September–May)

Ticktin

417 **Hepatic and Metabolic Diseases** (5)

Participation in clinical studies of patients with hepatic and pancreatic diseases; endoscopy, splenoportography, liver biopsy, peritoneoscopy. 2 seniors; 4-week elective periods. Univ. Hosp. (September–May)

Postow

420 **Clinical Gastroenterology** (5 or 10)

Clinical work in gastroenterology, including participation in GI procedures, biopsies, and endoscopies. 1 senior; 4- or 8-week elective periods. D.C. Gen. Hosp. (September–May)

Trujillo

423 **Clinical Gastroenterology** (5)

Introduction to clinical problems in diagnosis and treatment of gastroenterology in both office and hospital practice. Peritoneoscopy, endoscopy, and biopsies. 1 senior; 4-week elective periods. D.C. and Univ. hosps. (September–May)

Dobbins

424 **Morphology of the Intestines** (10)

Research designed to acquaint the student with a variety of morphologic techniques used in the study of mucosal disease of the gastrointestinal tract. Includes electron microscopy and light microscopy techniques—phase and fluorescent microscopy. Preference given to student able to

continue on a part-time basis following completion of the elective. 1 senior; 8-week elective periods. Univ. Clinic (September–May)

426 **Research in Metabolism of Sulphur Amino Acids** (15) Finkelstein

Control of methionine metabolism in mammalian tissues using several research techniques: kinetic properties of purified enzymes; induction and repression of enzymes by hormones and diet; metabolism of methionine in the isolated perfused rat liver. Projects available in any of the above areas and will be developed further to meet student needs. Research seminars at this and other institutions in the Washington area. 1 senior; 12-week elective periods. V.A. Hosp. (September–May)

430 **Clinical Hematology** (5) Schechter*

Under the supervision of members of the staff of the Hematology Section, the student will observe patients with hematological problems and will learn the techniques of bone marrow aspiration and biopsy. Tri-weekly rounds, morphology review sessions, participation in weekly clinic and Journal Club. 1 senior; 4-week elective periods. V.A. Hosp. (September–May)

431 **Clinical Hematology** (5 or 10) Lessin, O'Leary

Participation in the diagnosis and therapy of hematologic disorders, including inpatient and outpatient hematology consultations, daily care, and follow-up of clinical hematologic problems. Emphasis on acquainting the student with modern hematologic diagnostic procedures and current literature. 2 seniors; 4- or 8-week elective periods. Univ. Hosp. and Clinic (September–May)

432 **Clinical Hematology** (5) Pierce

Clinical evaluation of inpatients and outpatients with symptoms referrable to the myelopoietic system using bedside and laboratory investigative parameters. 1 senior; 4-week elective periods. Wash. Hosp. Center (September–May)

433 **Hematology** (5) Rheingold

Observation of and participation in diagnosis and treatment of patients with hematologic disorders. 1 senior; 4-week elective periods. Univ. Hosp. (September–May)

434 **Clinical Hematology** (5) Corn

Participation in clinical and laboratory studies of patients with hematologic disorders, study of bone marrow and peripheral blood smears, hemaglobin electrophoresis and evaluation of coagulation mechanism. 1 senior; 4-week elective periods. D.C. Gen. Hosp. (September–May)

435 **Hematology Research** (10) Lessin, O'Leary

Participation in the Hematology Research Laboratory. Emphasis on development of the student's own project related to dynamic morphology of the blood cells, blood cell ultrastructure, and electron microscopy techniques. Additional research study in tumor immunology and coagulation techniques available. Brief research paper required. 3 seniors; 8-week elective periods. Univ. Hosp. (September–May)

436 **Hematology Research** (10 or 15) McFarland†

For students interested in both clinical problems and a research project in hematology. Research of the Hematology Laboratory deals with lymphocytebiology, in particular lymphocyte blastogenesis and lymphocyte-

*Dr. Schechter is a member of the Hematology Section at the Veterans Administration Hospital.
†Dr. McFarland is Chief of the Hematology Section at the Veterans Administration Hospital.

macrophage interactions; *in vitro* human and animal lymphocyte cultures. 1 senior; 8- or 12-week elective periods. V.A. Hosp. (September–May)

D. Massaro

440 **Pulmonary Medicine** (5, 10, or 15)

Introduction to the diagnosis and treatment of diseases of the lung; experience in the management of patients with acute respiratory failure. Participation in daily ward rounds with a full-time faculty member and in weekly Pulmonary Grand Rounds and the Lung Seminar Series. Work-up each week of one new inpatient with tuberculosis and of one new non-tuberculous inpatient, including appropriate diagnostic and complete pulmonary function testing. 4 seniors; 4- or 8- or 10-week elective periods. V.A. Hosp. (September–May)

Witorsch

442 **Pulmonary Diseases** (5)

Performance and interpretation of pulmonary function studies, including ventilatory, diffusing capacity, and blood gas analysis; daily teaching rounds and supervised consultation on patients with various pulmonary and infectious diseases. Participation in Pulmonary Clinic; techniques and principles of inhalation therapy. 1 senior; 4-week elective periods. Wash. Hosp. Center (September–May)

D. Massaro

447 **Research in Pulmonary Diseases** (15)

Detailed studies of the synthesis and regulation of lung surfactant, mechanisms of airways obstruction, or immunological aspects of lung disease. 3 seniors; 12-week elective periods. V.A. Hosp. (September–May)

Felts

451 **Arthritis and Rheumatic Diseases** (5)

Introduction to clinical problems in the diagnosis and treatment of arthritis and rheumatic diseases. Emphasis on patient evaluation and establishment of therapeutic priorities. 2 seniors; 4-week elective periods. Univ. Clinic (September–May)

Alepa*

452 **Clinical Rheumatology** (10)

Observation of rheumatology inpatient consultations and participation in the Rheumatology Clinic. Laboratory facilities available with emphasis on synovial fluid analysis. Special diagnostic techniques, such as needle biopsy of the synovial membrane. Differential diagnosis and management of patients with rheumatologic disorders. 1 senior; 8-week elective periods. V.A. Hosp. (September–May)

Barth

453 **Introduction to Arthritis** (5)

Work-up, rounds, clinic, and consultations on patients with arthritis and rheumatic diseases. Daily discussions on selected topics in rheumatology, including clinical immunology, major disease categories (SLE, RA, gout, etc.); differential diagnosis, drug therapy, serological reactions, X-ray changes. 5 seniors; 4-week elective periods. Wash. Hosp. Center (September–May)

Tamagna

454 **Total Patient Care** (5)

Participation in total patient care program, including medical rehabilitation and group evaluation conferences. 1 senior; 4-week elective periods. Univ. Clinic (September–May)

* Dr. Alepa is Chief of the Rheumatology Section at the Veterans Administration Hospital.

460 **Renal and Electrolyte Disorders** (5) Berkman

Participation in consultations on renal and electrolyte abnormalities; follow-up of patients. Examination of the urinary sediment and in peritoneal and hemodialysis. Conferences, reading assignments, ward rounds, participation in Journal Club. Student may participate in a research project during an extended elective period. 2 seniors; 4-week elective periods. Wash. Hosp. Center (September–May)

461 **Clinical Renal Disease** (5) Parrish, N. Kramer

Participation in clinical and laboratory procedures used in the study of renal disease. Ward rounds, consultations, conferences, seminars. 2 seniors; 4-week elective periods. D.C. Gen. and Univ. hosps. (September–May)

463 **Clinical Application of Tissue Immunology** (5) N. Kramer

Application of immunologic methods to the study of human hypersensitivity states and metabolic diseases; study of serum proteins, including protein hormones and enzymes; research principles and methods. 1 senior; 4-week elective periods. Univ. Hosp. (September–May)

465 **Renal Diseases and Fluid and Electrolyte Problems** (5 or 10) Jacobson

Participation in office and hospital consultations; care of patients with renal diseases and fluid and electrolyte problems. Student becomes familiar with a variety of renal problems; works up patients with renal disease; evaluates renal function studies. Emphasis on critical use of medical literature. 1 senior; 4- or 8-week elective periods. (January 28–May 19)

466 **Clinical Nephrology** (5 or 10) Thompson

Participation in care of patients with wide variety of renal diseases and fluid and electrolyte abnormalities. Consultations, inpatient and outpatient care, ward rounds, conferences, seminars, diagnostic procedures, acute peritoneal and hemodialysis. 1 senior; 4- or 8-week elective periods. D.C. Gen. Hosp. (September–May)

469 **Clinical Renal Disease** (5 or 10) Shalhoub*

Broad exposure and active participation in all the clinical activities of the Renal Section, including consultations, outpatient clinic, rounds, conferences, and Journal Club meetings. Instruction in the indications and techniques of acute and chronic hemodialysis and peritoneal dialysis. 2 seniors; 4- or 8-week elective periods. V.A. Hosp. (September–May)

471 **Research in Renal Disease** (10 or 15) Shalhoub*

Standard clearance techniques in man and dog (renal and electrolyte physiology), metabolic studies on kidney slices, studies on erythropoietin secretion. Standard instrumentation and analytical procedures of a renal research laboratory, including inulins, PAH, electrolytes, osmolality, and pH. 1 senior; 8- or 12-week elective periods. V.A. Hosp. (September–May)

473 **Research in Mechanisms of Sodium Homeostasis** (15) Keimowitz

Supervised laboratory research on the mechanisms of sodium homeostasis *in vitro* and *in vivo* animal studies using various techniques, including isotopic tracer experiments. Readings from relevant physiological and clinical literature. 1 senior; 12-week elective periods. Univ. Hosp. (September–May)

* Dr. Shalhoub is Chief of the Renal Section at the Veterans Administration Hospital.

Cohn*

480 **Clinical Hemodynamics** (5 or 10)
Introduction to hemodynamic techniques in man, including measurement of left ventricular function, cardiac output, hepatic blood flow, renal blood flow, intrarenal blood flow distribution, and extremity blood flow. Management of circulatory abnormalities in a variety of medical diseases, including myocardial infarction, shock, orthostatic hypotension, systemic hypertension, and congestive heart failure. Students may participate in cardiovascular studies in the animal laboratory. 2 seniors; 4- or 8-week elective periods. V.A. Hosp. (September–May)

Sauerbrunn†

483 **Nuclear Medicine** (15)
Introduction to radioisotope methodology as applied to diagnostic or therapeutic problems in medicine. Study of the unique properties of radioactivity, radiation safety, and instrumental uses in the detection of radiation. Clinical application of nuclear medicine allows the student to participate in evaluation of patients referred for diagnostic and therapeutic studies. Assigned readings, daily conferences, laboratory instruction. Student may choose a selected field of interest for more intensive study and may engage in limited participation in on-going clinical research projects. 2 seniors; 12-week elective periods. V.A. Hosp. (September–May)

Microbiology

Acting Chairman: L.F. Affronti

Professors Mary Louise Robbins, Rudolph Hugh, E.M. Lerner II *(Research)*, L.F. Affronti
Professorial Lecturers Dorothy Heilman *(Cellular Immunology)*, F.B. Gordon *(Virology)*
Associate Professors Melvin Reich, Kun-yen Huang
Assistant Professors G.L. Wright, Jr., Yang-Ming Chu, Rosalie De Giovanni-Donnelly *(Research)*
Special Lecturer M.S. Legator *(Microbial Genetics)*

Staff

‡201 **Medical Microbiology** (6)
For medical students; open to qualified graduate students. Bacteria, rickettsiae, viruses, yeasts, molds, protozoa, metazoa which relate to the health and disease of man—cultural studies, methods of diagnoses, theories. Laboratory fee for nonmedical students, $16. (Spring)

Chu

214 **Tissue Cell Culture and Somatic Variation** (4)
Techniques of tissue culture and means of studying somatic variations. Prerequisite: Micr 201 or equivalent. (Spring)

Robbins

219–20 **Scientific Writing for Graduate Students** (1–1)
Required of all graduate students prior to writing a thesis or dissertation. (Academic year)

* Dr. Cohn is Chief of the Section of Hypertension and Clinical Hemodynamics at the Veterans Administration Hospital.
† Dr. Sauerbrunn is Chief of Nuclear Medicine at the Veterans Administration Hospital.
‡ Required for medical students.

221 **Methods of Scientific Presentation for Graduate Students** (1) Wright

Photography and graphic arts presentation of research data for publication and scientific meetings. Prerequisite: Micr 219–20. Laboratory fee, $16. (Fall)

223 **Antimicrobial Chemotherapy** (1) Affronti, Reich

For medical students. Selection, clinical applications, and mechanism of action of various drugs and antibiotics used in the treatment of microbial infections. Prerequisite: Micr 201. (Fall)

225 **Microbial Physiology I** (3) Affronti, Reich

Morphology and biochemistry of various microorganisms with emphasis on bacteria. Prerequisite: Bioc 201 or 221–22; Micr 201. (Fall)

226 **Microbial Physiology II** (3) Affronti, Reich

Effects of physical and chemical agents on microorganisms with emphasis on antibiotics. Prerequisite: Micr 225 or permission of instructor. (Spring)

227 **Basic Genetic Mechanisms** (1) De Giovanni-Donnelly

Genetic concepts and how they relate to man in today's environment. (Fall)

230 **Immunology** (4) Wright

Fundamental immunologic concepts. Serologic and immunologic procedures as applied to clinical and research situations emphasized. Prerequisite: Micr 201 or permission of instructor. Laboratory fee for nonmedical students, $16. (Fall)

231 **Immunobiology** (1) Wright and Staff

Study of immunological functions of reticulo-endothelial tissues, theories of autoimmunity, graft rejection, tumor immunity, delayed hypersensitivities, and immunogenetics. (Fall)

233 **Biology of Viruses** (2) Robbins, Huang

Biochemical and genetic characterization of viruses. Prerequisite: Micr 201 or equivalent. (Fall)

234 **Biology of Viruses—Laboratory** (2) Robbins, Huang

Laboratory complement to Micr 233. Prerequisite or concurrent registration: Micr 233. Laboratory fee for nonmedical students, $16. (Fall)

235 **Systematic Bacteriology** (2) Hugh

History of bacterial classification, international rules of nomenclature as applied to bacteria, development of bacterial classification based on relationships, survey of characteristics of bacterial groups. Prerequisite: Micr 201 or equivalent. (1973–74 and alternate years: fall)

251 **Bacteriology** (2) Hugh

Primarily elective course for medical students; open to graduate students. Clinical situations involving bacteriology; emphasis on the manner in which infectious agents bring about disease processes. Prerequisite: Micr 201 or equivalent. (Fall)

255 **Virology** (2) Huang, Robbins
Primarily elective course for medical students; open to graduate students. General principles of virology; emphasis on clinical situations. Prerequisite: Micr 201 or equivalent. (Fall)

257 **Experimental Immunochemistry** (3) Wright
Biochemical and physiochemical characterization of antigens and antibodies. Prerequisite: Bioc 221–22 or equivalent, Micr 230. Laboratory fee for nonmedical students, $16. Limited enrollment. (1973–74 and alternate years: spring)

258 **Microbial Genetics** (2) De Giovanni-Donnelly, Legator
Survey of microbial systems that depict basic concepts of genetic principles. Prerequisite: Micr 201 or equivalent. (Spring)

277–78 **Seminar: Microbiology** (1–1) Staff
Required of graduate students. (Academic year)

280 **Virology** (10) Huang, Robbins
Selected problems; library assignments, laboratory studies. 4 seniors; 8-week elective periods. School of Medicine (September–May)

281 **Biological Basis of Infections** (5) Affronti, Reich
Selected problems; library assignments, laboratory studies, term paper. 5 seniors; 4-week elective periods. School of Medicine (September–May)

282 **Immunology** (5) Wright, Chu
Selected problems, library assignments, laboratory research. 4 seniors; 4-week elective periods. School of Medicine (September–May)

283 **Bacteriology** (10) Hugh
Selected problems; library assignments, laboratory studies, term paper. 2 seniors; 8-week elective periods. School of Medicine (September–May)

284 **Microbial Genetics** (5) De Giovanni-Donnelly
Selected problems, library assignments, laboratory studies, term paper. 3 seniors; 4-week elective periods. School of Medicine (September–May)

285 ***In vitro* Study of Immune Responses** (10) Chu
(Formerly Immunologic Characterization of Cell Lines in Tissue Culture)
Preparation of specific antigens from a cell strain and production of antibodies against this strain in appropriate mammalian host; identification of unknown cell types using tissue culture, serology, immunochemistry. 2 seniors; 8-week elective periods. (September–May)

289 **Inflammation, Immunity, and Hypersensitivity** (5) Affronti and Staff
5 seniors; 4-week elective periods. (September–May)

290 **Extramural Microbiology Elective** (arr.)
The Department arranges for medical students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

293 **Special Topics in Microbiology** (arr.) Staff
Selected topics in microbiology. May be repeated for credit. (Fall and spring)

295 **Research in Microbiology** (arr.) Staff
Content differs each time the course is offered; may be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Neurological Surgery

Chairman: H.V. Rizzoli

Professor H.V. Rizzoli
Clinical Professors J.M. Williams, H.H. Ammerman, Giovanni Di Chiro, G.J. Hayes, J.M. Van Buren
Professorial Lecturer K.M. Earle
Associate Professors J.L. Fox, T.H. Milhorat
Associate Clinical Professors J.P. Murphy, L.G. Kempe, N.H. Horwitz, Ruth Jakoby
Assistant Professor Emanuele Mannarino
Assistant Clinical Professors G.M. Swain, A.P. Hustead, W.M. Hammon
Assistant Professorial Lecturer A.E. Wentz
Instructor C.W. Campbell
Clinical Instructors R.A. Mendelsohn, J.W. Barrett, C.P.H. Carroll, F.D. Cooney, J.A. Gulbrandsen

380 **Clinical Neurosurgery** (5) Staff
Clinical clerkship in neurosurgical service. Emphasis on neurologic examination; indications for special neurologic tests, e.g., arteriograms, pneumoencephalograms, etc.; and operative procedures. 3 seniors; 4-week elective periods. Univ. Clinic

381 **Clinical Neurosurgery** (5) Kempe
Participation in all departmental activities: ward rounds, daily conferences, radiographic and pathologic studies, operating room procedures; emphasis on studies of cerebral circulation. 2 seniors; 4-week elective periods. Walter Reed Gen. Hosp.

385 **Clinical Neurosurgery** (5) Fox
Clinical clerkship includes experience with diagnostic procedures: arteriograms, pneumoencephalograms, myelograms, and assisting in operating

room; conferences and ward rounds. 1 senior; 4-week elective periods. V.A. Hosp. (January–May) Horwitz

387 **Clinical Neurosurgery** (5)

Participation in all departmental activities, including ward rounds, daily conferences, radiographic and pathologic studies, and operating room procedures. 2 seniors; 4-week elective periods. Wash. Hosp. Center (September–May)

390 **Extramural Neurosurgery Elective** (arr.)

The Department arranges for students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

Neurology

Chairman: Sean O'Reilly
Director of Encephalographic Laboratory: Sean O'Reilly

Professors Harold Stevens, Sean O'Reilly, M.J. Malone, Helen Hess
Clinical Professors R.H. Groh, W.K. Engel, Franklin Meister
Professorial Lecturers K.M. Earle, N.P. Goldstein
Associate Professors Ann Barnet, Karin Nelson
Associate Clinical Professors A.S. Dekaban, H.H. Schwamb, Antonio Stazio, Ntinos Myrianthopoulos
Assistant Professors R.B. Weber, W.H. Lawrence, M.M. Platt
Assistant Clinical Professors G.D. Weickhardt, Virginia Duggins, Cosimo Ajmone Marsan, T.W. Kelly, A.D. Huott, Kristof Abraham
Clinical Instructors M.C. Korengold, R.H. Robertson, E.C. Wilner, Miryam Davis, Howard Silby, David Satinsky, B.H. Natelson

380 **Clinical Neurology** (5) O'Reilly, Stevens, Weber

Clinical clerkship in neurology. Emphasis on neurologic examination; indications for special neurologic tests, e.g., arteriograms, pneumoencephalograms, etc. 2 seniors; 4-week elective periods. Univ. Hosp. (September–May)

382 **Pediatric Neurology** (5) Malone and Staff

Clinical clerkship in diagnostic study and care of inpatients and outpatients; conferences and teaching sessions. 2 seniors; 4-week elective periods. Children's Hosp. (September–May)

383 **Clinical Neurology** (5) Schwamb

Emphasis on neurological examination and basic sciences, including neuroanatomy, as applied to clinical material. 2 seniors; 4-week elective periods. Walter Reed Gen. Hosp. (September–May)

386 **Clinical Neurology** (10) Goldstein

Clinical clerkship under close supervision of highly experienced clinicians and teachers. Trainees prepare histories and conduct physicals, attend rounds and conferences, assist in routine procedures. Abundant clinical material available. 2 seniors; 8-week elective periods. Mayo Clinic (September–May)

390 **Extramural Neurology Elective** (arr.)

The Department arranges for students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

Obstetrics and Gynecology

Acting Chairman: J.G. Sites

Professors R.H. Barter, J.G. Sites
Clinical Professor R.A. Chez
Associate Professors Benny Waxman, Larry McGowan
Associate Clinical Professors W.T. Lady, W.P. McKelway, J.W. Pearson, Jr., Shirley Martin, M.S. Kaufman, M.P. Footer, Donald Walters, J.M. Friedman, B.W. Richwine, Peter Soyster, T.A. Wilson, J.C. Walsh, W.H. Cooper, L.M. Liverett
Assistant Professors C.B. Jacobson, J.L. Marlow
Assistant Clinical Professors J.R. Epstein, S.H. Shea, G.L. Jarvis, N.J. Price, H.P. Treichler, I.W. Rovner, M.W. Sandmeyer, Jr., N.M. Tart, R.B. Nelson, Louis Goldstein, George Speck, A.W. Winshel, R.V. Erkenbeck, L.Q. Pugsley, H.L. Kotz, O.I. Dodek, Jr., H.A. Donald, Julius Fogel, A.I. Robins, S.M. Belinsky, S.F. Stewart, Jr., W.F. Peterson, C.D. Crystle, C.R.A. Gilbert
Instructor T.L. Jones
Clinical Instructors A.S. Bright, Elizabeth Crisp, E.E. Gahres, D.R. Carlson, E.E. Cunningham, Geraldine Paul, M.H. Hird, Josiah Sacks, R.E. Badwey, G.R. Hewlett, E.W. Titus, Jr., T.H. Gresinger, J.M. Close, E.R. Kolvereid, D.M. Margulies, J.C. Skilling, S.D. Cooley, L.E. Fettig, R.W. Smith, W.D. Wallace, Jr., R.M. Regan, B.A. Band, C.E. Townsend, D.H. Martin, W.R. Perkins, L.C. Radice, J.E. Anderson, A.A. de Moya, C.J. Gueriera, Erika Latchis, D.C. Meek, A.A. Becker, C.D. Lord, H.C. Beaver, Carlena Campbell, Meyer Rosenbaum, Melchior Savarese, David Davoudlarian, Marc Fialco, J.B. Credle, S.T. Lee, A.H. Lester, R.J. Pierce, C.I. Schneiderman, J.E. Alarcon, A.A. Greenfield, Jay Grodin, Raymond Gambrill III, Mabelle Cremer

*303 **Clinical Obstetrics and Gynecology** (10) Staff

Participation in all obstetrical and gynecological clinics, daily departmental conferences and ward rounds at University, Fairfax, and Columbia hospitals. Manikin demonstrations of mechanism of labor and various types of operative delivery. (8-week periods throughout academic year)

351 **Introduction to Clinical Practice** (1) Jacobson

Introduction of first-year medical students to patient situations by members of the clinical staff. Designed to stimulate questions and discussions regarding physical, financial, and moral implications of medical practice. 25 students. Univ. Hosp. (Spring)

*Required for medical students.

375 **Family Planning Clinic** (5) Waxman
Participation in instruction and follow-up of patients in a family planning clinic. Use of hormonal and mechanical contraception. 2 seniors; 4-week elective periods. (September–May)

376 **Clinical Obstetrics and Gynecology** (5) Sites, McKelway, Titus
Participation in office practice of obstetrics and gynecology. 1 senior; 4-week elective periods. (September–May)

377 **Clinical Obstetrics and Gynecology** (5) Cooper
Participation in office practice of obstetrics and gynecology. 1 senior; 4-week elective periods. (September–May)

378 **Clinical Obstetrics and Gynecology** (5) Pugsley, Cooley
Participation in office practice of obstetrics and gynecology. 1 senior; 4-week elective periods. (September–May)

379 **Clinical Obstetrics and Gynecology** (5) Footer, Friedman
Participation in office practice of obstetrics and gynecology. 1 senior; 4-week elective periods. (September–May)

380 **Gynecologic Oncology** (5) McGowan
Participation in the clinical inpatient and outpatient care of women with gynecologic cancer; related research in the areas of cytology. 2 seniors; 4-week elective periods. Univ. Clinic (September–May)

381 **Clinical Obstetrics and Gynecology** (5) Waxman, McGowan
Participation in office practice of obstetrics and gynecology. 2 seniors; 4-week elective periods. Univ. Clinic (September–May)

382 **Fetal Monitoring in Labor** (5) Waxman
Experience in application of fetal monitoring, accumulation and interpretation of data. Participation in intra-partum study of effects on the fetus of labor position, medication, and types of delivery. 2 seniors; 4-week elective periods. Univ. Clinic (September–May)

383 **Clinical Obstetrics** (5) Nelson
Includes prenatal clinics, lying-in periods, delivery and postpartum care; rounds, conferences, seminars. 2 seniors; 4-week elective periods. Wash. Hosp. Center (September–May)

384 **Clinical Gynecology** (5) Gahres
Case assignments, rounds and conferences, including tumor board; gynecologic pathology, preparation for surgery, attendance at surgery, postoperative care. 2 seniors; 4-week elective periods. Wash. Hosp. Center (September–May)

385 **Clinical Obstetrics and Gynecology** (5) Price, Treichler
Participation in office practice of obstetrics and gynecology. 1 senior; 4-week elective periods. (September–May)

386 **Inpatient Obstetrics and Gynecology** (5) Patow*
Supervised instruction in large military hospital; rounds and conferences. 4 seniors; 4-week elective periods. Walter Reed Gen. Hosp. (September–May)

* Dr. Patow is Chief of the Obstetrics and Gynecology Service at Walter Reed General Hospital.

387 **Clinical Obstetrics and Gynecology** (5) Cooper, Walters, Jarvis

Participation in patient care; rounds and conferences. 2 seniors; 4-week elective periods. Sibley Memorial Hosp. (September–May)

388 **Clinical Obstetrics and Gynecology** (5) Price

All aspects of inpatient and outpatient obstetrical and gynecologic services; rounds, obstetrical-gynecologic conferences, gynecologic pathology conferences; obstetrical anesthesia; Emergency Room consultations. Home visits to selected patients with Health Department Nurse. 2 seniors; 4-week elective periods. Fairfax Hosp. (September–May)

389 **Clinical Obstetrics and Gynecology** (5) Marlow

Participation in patient care, rounds, and conferences. 2 seniors; 4-week elective periods. Columbia Hosp. (September–May)

390 **Extramural Obstetrics and Gynecology Elective** (arr.)

The Department arranges for students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

391 **Cytogenetics** (1) Jacobson

Clinical chromosomal anomalies in man, experimental design and data analysis in cytogenetics, two cytogenetics techniques, sex chromatin analysis, tissue culture procedures. Special students admitted with approval of instructor. (1974–75 and alternate years: fall)

392 **Reproductive Genetics** (1) Jacobson

For medical students; open to graduate students with permission of instructor. Lectures with guest speakers, covering current methodology. Emphasis on human infertility; clinical case presentation and review utilized whenever possible. Major topics: gametogenesis, *in vivo* gamete manipulation and fertilization, nidation, and selective factors in development. 15 2nd-year medical students. Univ. Hosp. (Fall)

395 **Gametogenesis** (1) Jacobson

For medical students; open to graduate students with permission of instructor. Seminar course with guest lecturers. Covers various clinical and experimental factors in gametogenesis. Emphasis on histogenesis of the gonads, environmental and clinical variables in infertility. 25 1st-year students. Univ. Hosp. (Spring)

399 **Medical Genetics** (1) Jacobson

Clinical examples of genetic disease. Emphasis on basic principles such as linkage, heterogenity, mutation, and pedigree inheritance. The goal of the course is to provide the knowledge and skills needed to diagnose, manage, and counsel common genetic disorders. (1974–75 and alternate years: fall)

Ophthalmology

Chairman: M.F. Armaly

Professor M.F. Armaly

Clinical Professors J.H. King, Jr., M.M. Parks, M.G. Alper, L.E. Zimmerman
Associate Professor B.S. Fine *(Research)*
Assistant Professors D.S. Friendly, R.B. Weber, Dertad Manguikian, K.R. Rao, M.O. Ts'o *(Research)*, Jean Swartz *(Research)*
Assistant Clinical Professors W.J. Romejko, W.P. Chalfant, Jr., R.E. duPrey, Robert Day, J.H. Lodge, W.B. Glew, J.T. Schwartz, K.A. Simon, H.A. Urweider, B.H. Zeavin, H.N. Bernstein, D.K. Berler, J.N. Goldman, A.L. Fjordbotten, W.S. Gilbert, H.S. Wicker, D.G. Albert, S.P. Ginsberg
Instructor R.N. Sunga
Clinical Instructors J.R. Weimer, S.S. Pappas, Joanne Economon, R.S. Deitch, H.I. Rodman, George Liss, H.M. McAllister, L.E. Perraut, Victor Prezioso, H.J. Starr, M.H. Zimmerman, Leonard Kogan, J.F. Nowell, Bernard Ehrlich, D.L. Lanter, Richard Huberman, P.A. Dorn, Jr., E.M. Zimmerman, Joseph Snyder, B.S. Bruner, M.E. Lederman, L.E. Rothkoff, M.D. Krinn, Thomas Frey, Kenneth Somers, D.M. Wanicur, R.T. Lee

281 **Ophthalmic Pathology I** (1) L. Zimmerman
Basic science aspects of diseases of the eye. (Spring)

282 **Ophthalmic Pathology II** (3) L. Zimmerman
Diseases of the eye as revealed by gross and microscopic examination. 8 students. Armed Forces Inst. of Path. (Spring)

284 **Ophthalmic Pathology III** (5) L. Zimmerman
Daily participation in an active service limited to pathology of the eye and its adnexa. Inflammatory, degenerative, and neoplastic diseases comprise the major categories. 1 senior; 4-week elective periods. Armed Forces Inst. of Path. (Spring)

*302 **Ophthalmology** (OPD) (1) Armaly and Staff
Clinical instruction in external examination of the eye; tonometry and funduscopy. Use of ophthalmological instruments. (Fall)

380 **Clinical Ophthalmology** (5) Lodge, Friendly
Students will observe all types of eye conditions in ambulatory and hospitalized patients. 3 seniors; 4-week elective periods. Wash. Hosp. Center and Children's Hosp. (September–May)

381 **Clinical Ophthalmology** (5) Armaly
Introduction to clinical ophthalmology, demonstration of the methodology involved in eye examination, detection of normal and abnormal findings, and participation in outpatient and inpatient medical and surgical care. Lectures, seminars. 2 seniors; 4-week elective periods. Univ. Clinic (September–May)

382 **Research in Ophthalmology** (20) Armaly
1 senior; 16-week elective periods. Warwick Bldg. (January 28–May 19)

390 **Extramural Ophthalmology Elective** (arr.)
The Department arranges for students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

* Required for medical students.

Orthopaedic Surgery

Chairman: J.P. Adams
Associate Chairman: H.L. Feffer

Professors J.P. Adams, H.L. Feffer, Fred Leonard *(Research)*, D.W.McKay
Clinical Professors J.S. Neviaser, L.T. Peterson, Charles Keck
Associate Professors J.B. Christensen, P.I. Kenmore, R.J. Neviaser
Associate Clinical Professors R.L. Dow, Byron Genner III
Assistant Professor W.P. Fortune
Assistant Clinical Professors C.W. Metz, Jr., G.J. Schonholtz, G.I. Baker, S.H. Eisenberg, G.P. Bogumill, K.A. Peterson, L.A. Ottenritter, H.S. Cattell, B.P. Vitek, C.W. McCutchen *(Biomechanics)*, A.I. Dobranski, Stanford Lavine
Instructor S.S. Haas
Clinical Instructors Ronald Ottenberg, E.L. Radin, Richard Conant, Ulla Fortune, J.W. Harvey, R.M. Ackerman, N.E. Beisaw, R.J. Heilen, B.P. Gibbons, C.C. Liu

251 **Trauma—Anatomical, Orthopaedic, and Psychological Aspects** (1) Adams, Christensen
Lecture course for 1st-year medical students taught jointly by members of the departments of Orthopaedic Surgery, Anatomy, and Psychiatry and Behavioral Sciences. (Spring)

*302 **Clinical Clerkship in Orthopaedic Surgery**
2 weeks at the Univ. Hosp.

380 **Orthopaedic Surgery** (5) Adams and Staff
Rotating program: one week of adult orthopaedics at University Hospital; one week of children's orthopaedics at D.C. General Hospital or Children's Hospital; one week of general orthopaedics at Walter Reed General Hospital, Andrews Air Force Base Hospital, or National Naval Medical Center. 2 seniors; 4-week elective periods. (September–May)

381 **Orthopaedic Surgery** (5) Kenmore
Participation in total care program of orthopaedic patients: daily rounds, conferences, seminars. 2 seniors; 4-week elective periods. V.A. Hosp. (September–May)

390 **Extramural Orthopaedic Surgery** (arr.)
The Department arranges for students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

395 **Research in Orthopaedic Surgery** (5) Adams, Leonard
2 seniors; 4-week elective periods. Univ. Hosp. (September–May)

*Required for medical students. Credit is a part of and is assigned after completion of Surg 303.

Otolaryngology

Chairman: J.J. McFarland, Jr.

Associate Clinical Professor J.J. McFarland, Jr.
Assistant Clinical Professors J.L. Levine, M.E. Krucoff, R.S. Page, Jr., J.A. Sabri, W.M. Trible, B.M. Webb, R.E. Pumphrey, Jr.
Clinical Instructors I.S. Jaffee, R.D. Ralph, H.H.E. Scheidemandel, G.F. Miller, Jr., D.N.F. Fairbanks, Stephen Epstein, R.J. Bobys, Daniel Isaacson, B.A. Feldman, H.C. Stein

380 **Otolaryngology** (5 or 15) McFarland
Care of inpatients and outpatients, diagnosis, and therapy; rounds and conferences. 8 seniors; 4- or 12-week elective periods. Wash. Hosp. Center (September–May)

390 **Extramural Otolaryngology Elective** (arr.)
The Department arranges for students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

Pathology

Chairman: T.M. Peery

Professors T.M. Peery, W.R. Duryee *(Research Emeritus—Experimental)*, F.N. Miller, Jr., William Newman, J.C. Smith, A.W. Musser, B.H. Smith, Mary Matthews, Mario Werner *(Laboratory Medicine)*
Clinical Professors L.E. Zimmerman *(Ophthalmic)*, J.M. Blumberg, E.B. Helwig *(Dermatologic)*, G.H. Reifenstein, N.S. Irey, Robert Sauer *(Comparative)*, Cornelia Hoch-Ligeti, J.L. Luke *(Forensic)*
Professorial Lecturers P.D. Olch *(History of Medicine)*, Tatiana Antonovych
Associate Professors W.L. Marsh, Alexander Breslow, Lois Platt *(Cytology)*, F.S. Jannotta, L.S. Lessin *(Hematology)*, W.A. Burns, R.B. Lingeman, Nirmal Saini
Associate Clinical Professors V.E. Martens, R.E. Palmer, W.J. Jaffurs, M.A. Weinberger, C.B. Cook, H.A. Schwamm
Assistant Professors S.G. Kent, Suzanne Hammersberg *(Medical Technology)*, B.C. Zook *(Comparative)*, J.G. Guccion, F.P. Abramson *(Research)*
Assistant Clinical Professors W.F. Enos, Marjorie Williams, D.R. Parkinson, I.D. Godwin, F.M. Garner *(Comparative)*, Gloria Brennan, F.R. Robinson *(Comparative)*
Special Lecturers L.C. Johnson, R.S. Chandra

Medical Technology Course.—The Medical Technology Course consists of 12 months of didactic and practical work in clinical laboratory procedures, offered by the Department of Pathology in the University Hospital. Enrollment in the Medical Technology Course is strictly limited so that personal instruction can be given. Students ordinarily begin this course with the fall semester, but under exceptional circumstances may begin at other times.

Upon satisfactory completion of the course a certificate is awarded, and the candidate is eligible for the national certifying examination given by the Registry of Medical Technologists.

115–16 **Introduction to Medical Science** (1–1) Marsh, Hammersberg, and Staff

Lectures on physiology, pathology, and medicine to accompany Path 119–20. For medical technology students only. (Academic year—1 hour a week)

117–18 **Principles in Medical Technology** (4–4) Marsh, Hammersberg, and Staff

Theories, principles, sources of error of methods used in clinical chemistry, clinical bacteriology, serology, hematology, clinical microscopy. For medical technology students only. (Academic year—4 hours a week)

119–20 **Medical Technology Laboratory** (10–10) Marsh, Hammersberg, and Staff

Rotation through University Hospital pathology laboratories: hematology and urinalysis, 12 weeks; chemistry, 16 weeks; bacteriology and parasitology, 12 weeks; blood bank, 6 weeks; serology, 4 weeks. For medical technology students only. (35 hours a week for 50 weeks)

*201 **Pathology** (8) Staff

A general introduction to concepts of disease. Pathology of organ systems; correlation with symptoms and physical signs. Gross and microscopic study of diseased tissues. Case studies. (Fall—12 hours a week)

202 **Diagnostic Conferences** (1) J.C. Smith, Gusack

Case studies demonstrating pathologic significance of major clinical symptoms and physical signs. (Spring—1 hour a week)

†205 **Comparative Pathology I** (3) Zook

An introduction to the study of disease in vertebrates, comparison with disease in man. Mechanisms by which various agents provoke illness; body defensive reactions. Illustration of common diseases of various species, including material from captive wild animals. Recommended: courses in anatomy, histology, and physiology. (Fall—evening)

‡210 **Comparative Pathology Laboratory** (2) Zook, Sauer, Garner

Special assignments for dissection and study, including study of common diseases of captive wild animals. Path. Lab., Nat'l. Zoological Park (Fall—6 hours a week)

212 **Pulmonary Pathology** (1) Guccion

Basic disease processes reviewed and expanded upon. Lectures, case presentations, and group discussions, with correlation of clinical, radiological, and pathological changes. V.A. Hosp. (Spring—2 hours a week for 8 weeks)

214 **Diseases of the Liver** (1) Burns

The most important liver diseases, using the liver biopsy as the focal point. Clinical summary and microscopic findings, including electron microscopy where useful. V.A. Hosp. (Spring—2 hours a week for 8 weeks)

*Required for medical students; open to limited number of graduate students, with permission.
†An interdepartmental course offered by the departments of Pathology and Biological Sciences.
‡Open to limited number of graduate students, with permission.

*215 **Perinatal Pathology Laboratory** (2)
Special assignments for dissection and study. Univ. Hosp. (Fall—
hours a week)

216 **Necropsy Pathology** (2)
Review of current necropsy cases stressing interpretation of clinical symp
toms and signs and radiographs on the basis of gross changes in the
organs. V.A. Hosp. (Spring—2 hours a week)

252 **Forensic Pathology and Medical Jurisprudence** (1)
Somatic death, coroner and medical examiner systems, pathology of
physical and chemical injuries, medical licensure; the physician-patient
relationship and professional liability are discussed. (Spring—1 hour
a week)

253 **Medicine in Shakespeare** (1)
Seminars with student and staff presentations covering the plays of Wil
liam Shakespeare of medical significance. (Spring—1 hour a week)

254 **Medicine in Literature** (1)
Series of discussions with student and staff presentations covering novels,
dramas, nonfiction, and poetry of medical significance. (Fall—1 hour
a week)

260 **Obstetric and Gynecologic Pathology** (1)
Organ changes in normal and abnormal pregnancy, including both the
mother and the fetus. Diseases of female genital system. (Spring—
1 hour a week)

*262 **Problems in Experimental Cellular Pathology** (1)
Cytological and biochemical aspects of cellular function in relation to
normal and selected pathological conditions. (Spring—1 hour a week)

*266 **Comparative Pathology II** (1)
Participation in an autopsy service involving wild animals in captivity
and comparison of diseases in various animal species with those in man.
Limited to 4 students. Path. Lab., Nat'l. Zoological Park (Fall—four
3-hour sessions)

*271 **Tissue Reactions to Drugs** (1)
Study of the problems involved in recognizing instances of untoward re-
action to therapy. Case presentations. (Spring—1 hour a week)

274 **Medical Pathology** (2)
Study of cases from the necropsy service at University Hospital, evaluat-
ing and interpreting gross and microscopic tissue changes and correlating
them with clinical data. (Spring—2 hours a week)

*276 **Seminars in Pathology** (2)
Conferences on current topics in pathology, conducted by and primarily
for residents in pathology. Each student teams up with a resident to pre-
pare and present a seminar on a selected topic. Univ. Hosp. (Spring
—2 hours a week)

* Open to limited number of graduate students, with permission.

279 **Ophthalmic Pathology I** (1) Zimmerman

Basic science aspects of diseases of the eye. (Spring—1 hour a week)

280 **Surgical Pathology I** (4) Newman, Matthews, Palmer, Schwamm

Surgical pathology service at participating hospitals. Examining specimens from current surgical cases, correlating with clinical manifestations. Univ., V.A., Alexandria, and Andrews AFB hosps. (Spring—6 hours a week)

282 **Ophthalmic Pathology II** (3) Zimmerman

Diseases of the eye as revealed by gross and microscopic examination. Concurrent registration for Path 279 required. 6 students. Armed Forces Inst. of Path. (Spring—4 hours a week)

*283 **Anatomical Pathology Clerkship** (arr.) Staff

Necropsy and surgical pathology service. Prerequisite: Path 201. Graduate students receive 5 semester hours of credit for each 4-week period and may receive up to 30 semester hours of credit for 6 months full time. Medical students receive 5 semester hours of credit for each 4-week elective period. (Medical students: 3 seniors; 4- or 8-week elective periods; September–May. Graduate students: fall or spring.)

284 **Ophthalmic Pathology III** (5) Zimmerman

Daily participation in service limited to pathology of the eye and its adnexa. 1 senior; 4-week elective periods. Armed Forces Inst. of Path. (September–May)

285 **Clinical Pathology** (5) Martens

Selected techniques of clinical chemistry, hematology, bacteriology. Student selects laboratory problem. 4 seniors; 4-week elective period. Wash. Hosp. Center (September–May)

286 **Perinatal Pathology** (5) Kent

Participation in perinatal (fetal and newborn) necropsies. Study of selected teaching cases. Examination of selected placentas for disease. 1 senior; 4-week elective periods. Univ. Hosp. (September–May)

288 **Clinical Cytology** (5) L. Platt

Evaluation of cytologic smears, chiefly vaginal, as a screening procedure in cancer diagnosis. 1 senior; 4-week elective periods. Cytology Lab. (September–May)

289 **Clinical and Anatomical Pathology** (5) Cook

Daily studies of surgical and necropsy pathology, including forensic pathology; clinical pathology projects, including hematology, isotopology, bacteriology. 1 senior; 4-week elective periods. Fairfax Hosp. (September–May)

290 **Extramural Pathology Elective** (arr.)

The Department arranges for medical students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

*Open to limited number of graduate students, with permission.

291 **Clinical and/or Anatomical Pathology** (5) B. Smith

Students will have an opportunity to explore in depth a topic of interest to them in the field of pathology; library study. 2 seniors; 4-week elective periods. V.A. Hosp. (September–May)

292 **Experimental Pathology: Effect of Cancer on Tissue Composition** (5) Hoch-Ligeti

Participation in studies on the effect of cancer on the distribution and concentration of enzymes and other cellular components in the tissues of humans and experimental animals. Spectrophotometric, colorimetric, electrophoretic, histochemical, and histological techniques; limited participation in routine studies in pathology. Room and board furnished. 2 seniors; 4-week elective periods. V.A. Center, Martinsburg, W.Va. (September–May)

293 **Clinical and Anatomical Pathology** (5) Palmer

Participation in departmental activities, including clinical chemistry, blood bank, microbiology, and hematology; surgical pathology; autopsy pathology, including medico-legal autopsies. 1 senior; 4-week elective periods. Alexandria Hosp. (September–May)

294 **Forensic Pathology** (5) Luke

Participation in the activities of the Office of the Chief Medical Examiner of the District of Columbia: observation of scene investigation, participation in medico-legal autopsies, attendance at court trials, etc. 2 seniors; 4-week elective periods. Office of the Chief Medical Examiner (September–May)

295 **Comparative Pathology III** (arr.) Robinson, Zook, Sauer

Participation in veterinary pathology service, including wild and domestic animals. Prerequisite: Path 201, 283. Graduate students receive 5 semester hours of credit for each 4-week period and may receive up to 30 semester hours of credit for 6 months full time. Medical students receive 5 semester hours of credit for each 4-week elective period. (Medical students: 3 seniors; 4-week elective periods. Path. Lab., Nat'l. Zoological Park, and Armed Forces Inst. of Path. September–May. Graduate students: fall or spring.)

296 **Surgical Pathology II** (5) Newman

Evaluation of surgical specimens and correlation with clinical status of patient, description of gross and microscopic findings on assigned cases. 2 seniors; 4-week elective periods. Univ. Hosp. (September–May)

297 **Dermal Pathology** (5) Helwig

Microscopic conferences, review of current material and study sets. 2 seniors; 4-week elective periods. Armed Forces Inst. of Path. (September–May)

298 **Necropsy Pathology** (5) J.C. Smith, Breslow

Organ changes in disease, gross and microscopic examinations, preparation of protocols. 2 seniors; 4-week elective periods. Univ. Hosp. (September–May) Staff

299–300 **Thesis Research** (3–3)

(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Pharmacology

Chairman: H.G. Mandel

Professors H.G. Mandel, V.H. Cohn, Jr., Paul Mazel, S.E. Fabro *(Research)*
Professorial Lecturer F.E. Hahn
Associate Professors K.S. Kim *(Research)*, J.A. Straw
Assistant Professors Philip Klubes, Barbara Roth-Schechter, G.S. Edwards, F.P. Abramson *(Research)*, H.C. Harder, J.W. Dailey
Special Lecturer P.J. Creaven

*201 **Pharmacology** (8) Mandel and Staff
Lectures, laboratory, conferences on interaction of drugs and biological systems as a basis for rational therapy of disease. Prerequisite: biochemistry and physiology, or approval of Department. (Fall)

203 **Fundamental Principles of Pharmacology** (2) Staff
Basic principles of pharmacology, including drug-receptor interactions, structure activity relationships, pharmacokinetics, membrane phenomena, cellular control mechanisms, drug toxicity. (Fall)

215 **Adolescent Drug Abuse** (3) Cohn and Staff
Offered off campus through the College of General Studies. Multidisciplinary lectures and discussions concerning the physiological and psychological effects of narcotics, central nervous system stimulants and depressants, alcohol, and hallucinogenic and psychedelic drugs; psychosocial factors leading to adolescent drug abuse; legal implications of drug abuse; prevention, control, and treatment of drug abuse. (Fall and spring)

252 **Seminar: Clinical Pharmacology** (2) Staff
Problems in therapeutics; emphasis on drugs used in treatment of cardiovascular and infectious diseases. Enrollment limited. (1973–74 and alternate years: spring)

254 **Frontiers in Pharmacology** (1) Mandel and Staff
For medical and graduate students. Recent advances and fields of research in pharmacology. Presentations by laboratory scientists from neighboring institutions. (Spring)

256 **Molecular Pharmacology** (2) Hahn
For medical and graduate students. Current theory on action of drugs, especially chemotherapeutic agents, at molecular level. Effect of drugs on

*Required for medical students; open to graduate students.

biosynthetic processes of the cell with respect to DNA, messenger RNA, transfer RNA, ribosomes, protein, cell wall, and intermediary metabolites. Factors which alter action of drugs, such as drug interactions and resistance. (Spring)

258 **Cancer Chemotherapy** (1) Mandel and Staff
For medical and graduate students. Mechanisms by which drugs inhibit the growth of tumor cells. (1973–74 and alternate years: spring)

259 **Developmental Pharmacology** (1) Staff
For medical and graduate students. Lectures, seminars, conferences. Teratogenic actions of drugs; pharmacological principles which apply during prenatal and perinatal development. (1973–74 and alternate years: spring)

260 **Endocrine Pharmacology** (1) Kim
For medical and graduate students. Lectures and seminars on recent advances in the pharmacology and mechanism of action of various hormones. (1974–75 and alternate years: spring)

267 **Pharmacological Research** (arr.) Staff
For graduate students. Research with staff members. May be repeated once for credit toward a Master of Science degree. (Fall and spring)

269 **Pharmacology Seminar** (1) Staff
For graduate students. Recent advances in pharmacology. Content differs each time the course is offered; may be repeated once for credit. (Fall and spring)

272 **Physiological Disposition of Drugs** (3) Cohn
For medical and graduate students. Fate of drugs in biological tissue. Absorption, distribution, chemical alteration, excretion of drugs; physical, chemical, and biological factors affecting these processes. Limited to 20 students. Prerequisite: Phar 201. (1973–74 and alternate years: spring)

275–76 **Advanced Topics in Pharmacology I–II** (1–1) Staff
Lectures and seminars on advances in mechanisms of drug action, pharmacology of new drugs, theoretical aspects of pharmacology, laboratory techniques. (1973–74 and alternate years: academic year)

277–78 **Advanced Topics in Pharmacology III–IV** (1–1) Staff
Continuation of Phar 275–76. (1974-75 and alternate years: academic year)

279 **Special Topics in Pharmacology** (arr.) Staff
Selected aspects of drug action. Content differs each time the course is offered; may be repeated once for credit. (Fall and spring)

281 **Physiological Techniques in Pharmacology—Lecture** (2) Mazel, Straw
For medical and graduate students. Physiological techniques for obtaining information on mechanism and site of action of pharmacological agents. Limited to 20 students. Phar 281 may be taken without 282. Prerequisite: Phar 201. (1973–74 and alternate years: spring)

282 **Physiological Techniques in Pharmacology—Laboratory** (2) Mazel, Straw

Accompanies Phar 281. Prerequisite: Phar 201. Prerequisite or concurrent registration: Phar 281. (1973–74 and alternate years: spring)

283 **Biochemical Techniques in Pharmacology** (arr.) Cohn

For graduate students. Lecture and laboratory. Theory and practice of modern biochemical techniques applicable to study of metabolic fate and mechanism of action of drugs. Prerequisite: Phar 201. (As arranged)

285 **Readings in Pharmacology** (1) Staff

For medical students. Assigned reading and preparation of report. (Fall and spring)

286 **Research in Pharmacology** (arr.) Staff

For medical students. Participation in experimental studies in pharmacology, particularly bacterial chemotherapy, cancer chemotherapy, or drug metabolism. (Fall and spring)

295 **Reading and Research** (arr.) Staff

Independent study for students preparing for the Master of Science degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Physiology

Chairman: R.A. Kenney

Professors C.S. Tidball, R.A. Kenney, Elizabeth Tidball
Professorial Lecturer Leonard Laster
Associate Professors Marie Cassidy, M.J. Jackson, Michael McCally
Assistant Professors R.A. Lavine, D.W. Watkins
Special Lecturer L.L. Langley

Departmental prerequisite: Phyl 201 or equivalent is prerequisite to all courses in Physiology numbered above 201.

191 **Selected Topics in Human Structure and Function** (3) Kenney

Lecture (2 hours), laboratory (1 hour). Structural and functional basis of physiology. A required course for graduate students who have not had Anat 201 or equivalent. An undergraduate course; students may receive graduate credit on completion of additional work as prescribed by the instructor. Prerequisite: B Sc 11–12 or equivalent and consent of in-

structor. Open to Columbian College of Arts and Sciences students with the approval of the student's major adviser. (Fall)

Staff

*201 **Physiology** (8)

Lecture (8 hours), laboratory (2 hours), conference (1 hour). Cellular, organ system, and applied mammalian physiology. Prerequisite for graduate students: Anat 201 or Phyl 191, or equivalent; Bioc 201 or 221–22 (Bioc 222 may be taken concurrently); or consent of Chairman of Department. Open to Consortium students only with permission of Department Chairman. (Spring)

Jackson

221 **Seminar** (1)

Staff and student presentations from literature. Present work discussed, experimental design and scientific deduction evaluated. Topics to be announced. Prerequisite: a reading knowledge of French or German. Content differs each time the course is offered; may be repeated for credit. (Fall and spring)

E. Tidball

251 **History of Medicine** (1)

Survey of the great contributors to physiology and medicine in the context of the times in which they lived and worked. (Fall)

C. Tidball, E. Tidball

252 **Physiological Basis of Sexuality** (2)

Conference and discussion on topics including communication, psychosexual development, physiological responses, homosexuality, population control and family planning, fertility and sterility, and other topics of interest to the class. (Fall)

Staff

253 **Physiology of Fluid Balance and Hydrogen Ion Regulation** (2)

(Formerly Clinical Applications of Physiology)

Discussion on principles of fluid and acid-base balance and the application of these principles to specific situations. (Fall)

Staff

261 **Gastrointestinal Physiology** (2)

Lecture or conference 2 hours a week. Physiological approach to such clinical problems as peptic ulcer, malabsorption, ulcerative colitis, hepatitis, and others. (Fall)

Kenney

262 **Topics in Cardiovascular Physiology** (2)

Survey, at an advanced level, of aspects of cardiovascular physiology especially as interrelated with the respiratory and renal systems. (Fall)

Jackson

265 **Review of Endocrinology** (1)

Review of basic endocrinology. (Fall)

Jackson

266 **Advanced Endocrinology** (2)

Review at advanced level of selected topics in endocrinology and metabolism. Concurrent registration in Phyl 265 required. (Fall)

Kenney

267 **Renal Physiology** (2)

Lecture or conference 2 hours a week. Overview of renal physiology at advanced level.

* Required for medical students; open to graduate students.

268 **Computer Utilization in Physiology and Medicine** (2) C. Tidball
Lecture 1 hour a week, practical experience at student's convenience. Orientation to digital and analog mini-computers. Programming in several languages. Experience with one or more computers. No previous computer experience necessary. (Fall)

269 **Neurophysiology and Control Mechanisms** (2) Lavine
Selected topics in contemporary neurophysiology, including methods of data collection and analysis, control mechanisms involved in movement and behavior and sensory processing. Open to students in the School of Engineering and Applied Science with permission of instructor. (Fall)

270 **Electron Microscopy in Cellular Physiology** (1) Cassidy
Introduction to the applications of electron miscroscopy in the investigation of cellular physiology. (Fall)

273 **Investigative Electron Microscopy** (3) Cassidy
Lecture (2 hours), laboratory as arranged. Application of electron microscopy to biological investigative studies. Limited enrollment. Prerequisite: Anat 261 or equivalent. Admission by permission of instructor. (Fall)

281 **Experimental Gastrointestinal Physiology** (5) C. Tidball
2 seniors; 4-week elective periods. School of Medicine (September–May)

282 **Experimental Cellular Physiology** (5) Cassidy
2 seniors; 4-week elective periods. School of Medicine (September–May)

283 **Experimental Neuroendocrinology** (5) E. Tidball
2 seniors; 4-week elective periods. School of Medicine (September–May)

284 **Amphibian Epithelial Transport** (5 or 10) Watkins
2 seniors; 4- or 8-week elective periods. School of Medicine (September–May)

286 **Experimental Renal Physiology** (5) Kenney
2 seniors; 4-week elective periods. School of Medicine (September–May)

287 **Experimental Electron Microscopy** (5 or 10) Cassidy
2 seniors; 4- or 8-week elective periods. School of Medicine (September–May)

289 **Experimental Nutrition and Metabolism** (5) Jackson
2 seniors; 4-week elective periods. School of Medicine (September–May)

290 **Extramural Physiology Elective** (arr.)
The Department arranges for medical students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

291 **Experimental Neurophysiology** (5)
2 seniors; 4-week elective periods. School of Medicine (September–May)

295 **Research** (arr.)
By special arrangement with individual Staff members. Approximately 4 clock hours in the laboratory for each semester hour of credit. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

298 **Comprehensive Physiology** (arr.)
Guided review of selected areas of Physiology appropriate to the student's graduate program. This course satisfies the requirements for the Master's Comprehensive Examination, the Field Examination for doctoral students minoring in Physiology, and Part I of the Cumulative General Examination. Prerequisite or concurrent registration: Phyl 221. (Fall)

299–300 **Thesis Research** (3–3)
(Fall and spring)

396 **Advanced Reading and Research** (2)
Limited to students preparing for the Doctor of Philosophy general examination. Tutorial literature survey of a subfield of Physiology and of pertinent areas of the candidate's minor field. This course satisfies the requirement for Part II of the Cumulative General Examination in Physiology. (Fall and spring)

397 **Development of Dissertation Problem** (2)
(Formerly Phyl 398)
Limited to students preparing for the Doctor of Philosophy general examination. Preparation for written and oral presentation of dissertation problem. This course satisfies the requirement for Part III of the Cumulative General Examination in Physiology. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Psychiatry and Behavioral Sciences

Chairman: T.G. Webster

Professors Leon Yochelson, R.S. Lourie, J.E. Rankin, T.G. Webster
Clinical Professors D.C. Cameron, T.D. Noble, Sidney Berman, Morris Klein-erman, M.deG. Ruffin, Norman Taub, Samuel Yochelson *(Criminal Behavior)*, D.L. Bazelon *(Socio-legal Aspects)*, Leon Ferber, Paul Gray, Paul Chodoff, H.A. Meyersburg, F.N. Waldrop, Stanley Yolles, Harold Weiner *(Experimental Psychology)*, G.C. Salmoiraghi *(Neurophysiology and Neuropharmacology)*, Harvey Resnik, S.N. Kieffer, Leopold Bellak, William Stark, Bertram Brown
Professorial Lecturers W.E. Barton, H.D. Lederer, P.B. Hammond
Associate Professors H.M. Grigorian, R.M. Coleman, G.E. Morris *(Allied Health)*, J.J. McMillan *(Psychology)*

Associate Clinical Professors H.P. Laughlin, I.H. Kaiser, C.T. Bever, David Eden, S.I. Szara *(Psychopharmacology)*, Hans Weil-Malherbe *(Neurochemistry)*, J.G. Rubin, E.S. Fleming, R.M. Greenberg, W.D. Kehne, J.L. Sheridan, E.I. Kushner, J.H. Yacoubian, Jack Durell, John Kafka, H.B. Lehrman, I.H. Marill, T.D. Reynolds *(Experimental Psychiatry)*, P.S. Weisberg, C.J. Frederick *(Medical Psychology)*, L.D. Robinson, A.S. Abraham, Joseph Baker, Angelo D'Agostino, W.J. Stockton, Roger Peele, J.T. Quattlebaum, D.D. Cowell, M.R. Haas, Robert Dupont, Jr., David Reiss, Ayres D'Costa

Assistant Professors S.H. Lipsius, Jean Vazuka, Carolyn Robinowitz

Assistant Clinical Professors Sarah Tenenblatt, R.A. Rogers, J.A. Farrell, N.C. Rintz, F.G. Hilkert, I.D. Milowe, W.C. Johnson, R.A. Frank, Leslie Schaffer, A.H. Kiracofe, Jr., T.M. Mackenzie, R.N. Butler, J.H. Menetrez, Christine Kehne, M.A. Woodbury, W.H. Young, Jr., J.H. Bouma, B.L. Burris, Spencer Gordon, Jr., C.C.H. Cullander, D.A. Lanham, W.L. Taylor *(Experimental Psychology)*, D.L. Tippett, Archibald Ward, Jr. *(Sociology)*, W.G. Tompkins, Frances Thomas *(Social Work)*, S.L. Auster, Gertrude Cotts, Brian Crowley, Margaret Garrett, H.A. Greenberg, H.A. Hoffman, R.A. McElroy, B.P. McKaig, J.M. Post, William Davidson, J.A. Schoettler, Stephen Weissman, Pearl Holly, L.A. Cove, J.L. Evans, Larry Dizmang, Barton Pakull, C.R. Gray, M.J. Chalick, Geraldine Schaeffer, R.T. Lewit, A.M. Messore, W.F. Weber, R.W. Wadeson, Jr., M.T. Advani, Edward Black, D.H. Fram, M.J. Stern, G.A. Tripp, Michael Brody, David Grodsky, J.L. Hatleberg, J.A. Kachmarick, K.L. Kaplan, D.D. Pollock, Armando Saenz, Eleanor Sorrentino, Edith Taylor, S.J. Wolin, Stanley Greenspan, Barton Kraff

Instructors Ruth Richmond *(Social Work)*, Mildred Reynolds *(Social Work)*

Clinical Instructors W.H. Dobbs, W.A. Hamman, G.D. Legler, D.G. Lipman, S.A. Savitz, J.W. Voell, W.J. Polk, R.A. Blum, S.E. Samenow *(Psychology)*, W.F. Thompson, Martin Giller, D.I. Joseph, Judith Chused, Joan Sealy

Special Lecturers Julius Hoffman, J.T. English, J.B. Chassan *(Biostatistics)*

*252 **Development of the Person** (1) Staff

For 1st-year students. Basic presentation of normal personality development. (Spring)

*253 **Psychopathology** (1) Staff

For 2nd-year students. Fundamentals of maladaptive development. Mental retardation, unconscious mental mechanisms, psychosomatic disorders, and basic psychopathology of depression and schizophrenia. (Fall)

*302 **Clinical Clerkship** (5) Webster, Grigorian, Cowell, and Staff

Supervised examination, diagnosis, treatment of outpatients and inpatients at University and St. Elizabeths hospitals; case conferences, seminars on psychiatric referral, "psychiatric" drugs, community resources. Psychiatry in general practice stressed. (Fall and spring)

350 **Basic Psychopathology and Psychodynamics** (2) Staff

A seminar format using reading materials and clinical demonstrations to explore the basis of mental illness. Limited to 25 2nd-year students. (Fall)

*Required for medical students.

351 **The Role and Professional Identity of the Physician** (1) Grigorian
The class explores the personal and social factors of the role of the physician—the aspect of care, identity—through discussion conducted along group dynamic lines. Limited to 20 2nd-year students. (Fall and spring)

352 **Common Personality Configurations** (1) Polk, Lipsius
Selected commercial movies, viewed both during class and in student's free time, provide material illustrative of personality configurations and life styles to be analyzed in group discussions. Limited to 12 2nd-year students. (Fall)

382 **Clinical Psychiatry** (5) Cowell
Clinical care of patients hospitalized for emotional and mental disturbances. 2 seniors; 4-week elective periods. St. Elizabeths Hosp. (September–May)

383 **Psychiatric Day Care** (10) Advani
Participation in the evaluation of patients referred for day care and in the various activities and programs in the day care center. Research pertaining to the day care center in its role in the treatment of psychiatric patients. 2 seniors; 8-week elective periods. Psychiatric Inst. of Wash. (September–May)

384 **Geriatric Psychiatry** (5) Cowell
Care and rehabilitative efforts with elderly inpatients with psychiatric and other incapacities. 1 senior; 4-week elective periods. St. Elizabeths Hosp. (September–May)

385 **Schizophrenic Reactions** (5) Bullard*
Psychotherapy and ward management of schizophrenic patients. 2 seniors. 4-week elective periods. Chestnut Lodge, Rockville, Md. (September–May)

386 **Psychiatric Research** (5) Cowell
Research programs involving clinical and experimental investigations of human behavior. 2 seniors; 4-week elective periods. St. Elizabeths Hosp. (September–May)

387 **Clinical Psychiatry** (5) Webster
Care of inpatients and outpatients; diagnostic evaluations; individual and group psychotherapies, somatic therapies. 1 senior; 4-week elective periods. Univ. Hosp. (September–May)

388 **Research: Chronic Patient** (10) Meyersburg
Research into social, anthropological, psychological factors influencing long-term care of patients with chronic diseases. 2 seniors; 8-week elective periods. Univ. Hosp. (September–May)

389 **Day Hospitalization** (5–15) Crowley
Participation in the diagnostic and treatment programs of a separate and independent day hospital designed to prevent and replace full-time psychiatric hospitalization. Research in the area of partial hospitalization. 1 senior; one to three 4-week elective periods. Potomac Foundation for Mental Health. (September–May)

* Dr. Bullard is Senior Consultant at Chestnut Lodge.

390 **Extramural Psychiatry Elective** (arr.)

The Department arranges for students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

391 **Research: Constitutional Psychiatry** (10) S. Yochelson

Somatotypy, genetics, encephalography, sensory deprivation; emphasis on the criminal. 2 seniors; 8-week elective periods. St. Elizabeths Hosp. (September–May)

392 **Administrative Psychiatry** (5) Robinson

Apprenticeship to administrator of large public mental hospital. 1 senior; 4-week elective periods. St. Elizabeths Hosp. (September–May)

393 **Research: Psychiatric Aspects of Criminal Behavior** (5) S. Yochelson

Social, anthropological, psychological factors producing criminal behavior. 2 seniors; 4-week elective periods. St. Elizabeths Hosp. (September–May)

Radiology

Chairman: S.D. Rockoff
Associate Chairman: D.O. Davis
Directors of Divisions: S.D. Rockoff *(Diagnostic Radiology)*, R.C. Reba *(Nuclear Medicine, Co-director)*, V.J. Varma *(Nuclear Medicine, Co-director)*, Theodore Villafaña *(Radiation Physics)*, J.G. Maier *(Radiation Therapy)*

Professors S.D. Rockoff, R.C. Reba, J.G. Maier, D.O. Davis, J.E. Turner, Jr.
Clinical Professors A.C. Wyman, M.M. Reeder, J.L. Doppman
Professorial Lecturer J.M. LoPresti *(Pediatric)*
Associate Professor Massoud Majd-Ardekani
Associate Clinical Professors H.J. Kicherer, R.M. Caulk, H.M. Hagen, C.F. Murphy, W.J. Nelson, G.J. Augustin, C.J. Pearce
Assistant Professors S.J. Kurzbard, Sandra Last, D.H. Knudson, Theodore Villafaña, May Lesar, W.C. Eckelman, Ann Wolanske *(Allied Health)*
Assistant Clinical Professors S.R. Bersack, Bela Gondos, Marion Faris, G.A. Solack, A.S. Cigtay, V.K. Saini, M.A. Thomas, James Burwell, R.A. Butler, Sr., F.V. Schumacher, L.R. Milavickas
Assistant Professorial Lecturer R.C. Cavanagh
Instructors L.R. Kirkland, Jr., D.E.C. Hall
Clinical Instructors George Tievsky, U.V. Wilcox II, S.M. Perl, Louis Wener, D.C. Hendrix
Special Lecturers A.L. Byrne, R.L. Cain, B.N. Crowell, W.H. Morrison, L.F. Pridgen, F.R. Pugh, B.E. Smith, R.M. Weisenberger, W.C. Cail, R.G. Conant, D.C. Ervin, Jr., D.H. Manley, J.L. Naphier, A.A. Skrapits

383 **Clinical Radiology** (5) Wyman and Staff

Radiologic differential diagnosis; emphasis on the role of diagnostic radiology in clinical problem-solving. Each student is assigned a patient population and correlates the radiologic examinations with the clinical manifestations of disease. The student prepares a brief clinical and radio-

logical summary and participates in procedures, case conferences with staff members, and interaction with medical and surgical staff members. Daily lectures and staff conferences. 5 seniors; 4-week elective periods. Univ. Hosp. (September–May)

Burwell and Staff

384 **Diagnostic Radiology** (5)

Participation in general radiography, fluoroscopy, and special procedures; interpretation of radiologic procedures with staff; review and study of teaching film file. Attendance at medical, surgical, and pediatric staff conferences. 2 seniors; 4-week elective periods. Fairfax Hosp. (September–May)

Varma, Reba, and Staff

385 **Nuclear Medicine** (5)

Introduction to the physics of radioisotopes, radiochemistry, radiation detection, and instrumentation. Theory and operation of the nuclear camera and scanner. Study of organ imaging techniques, by lectures, conferences, and participation in patient care. Introduction to radio-immune assay. Correlation between clinical problems and nuclear diagnosis. 1 senior; 4-week elective periods. Univ. Hosp. and Wash. Hosp. Center (September–May)

Maier and Staff

386 **Radiation Therapy** (5)

Introduction to radiotherapeutic techniques, physics of high-energy radiation and instrumentation. Radiation treatment and correlated management of malignant diseases; emphasis on decision-making in a clinical practice. 1 senior; 4-week elective periods. Univ. Hosp. (September–May)

Reeder and Staff

388 **Diagnostic Radiology** (5)

Participation in general radiography, fluoroscopy, and special procedures; interpretation of radiologic procedures with staff; review and study of teaching film file; conferences. 2 seniors; 4-week elective periods. Walter Reed Gen. Hosp. (September–May)

Turner and Staff

389 **Diagnostic Radiology** (5)

Same as Rad 388. 2 seniors; 4-week elective periods. Nat'l Naval Med. Center (September–May)

390 **Extramural Radiology Elective** (arr.)

The Department arranges for students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

Schumacher and Staff

391 **Diagnostic Radiology** (5)

Same as Rad 388. 2 seniors; 4-week elective periods. Wash. Hosp. Center (September–May)

Surgery

Chairman: P.C. Adkins

Directors of Divisions: P.C. Adkins *(General Surgery, Thoracic and Cardiovascular Surgery)*, S.G. Mead *(Oral Surgery)*, J.G. Randolph *(Pediatric Surgery)*, L.W. Thompson *(Plastic Surgery)*

Professors C.T. Klopp *(Cancer)*, G.S. Letterman *(Plastic)*, J.G. Randolph, P.C. Adkins
Clinical Professors W.S. McCune, V.M. Iovine, G.A. Higgins, Jr., E.A. Gould, Francis Jackson, J.R. Thistlethwaite
Associate Professors H.C. Pierpont, T.C. Alford, J.E. McClenathan, P.E. Shorb, Jr., N.T. Tsangaris, J.R. Lilly, W.L. Joseph, L.W. Thompson
Associate Clinical Professors D.C. Wherry, Maxine Schurter, S.G. Mead *(Oral)*, J.H. Baugh, N.P.D. Smyth, Leon Gerber, D.H. Glew, Jr., Don Wenger, R.W. Parsons, J.M. Keshishian, N.H. Isaacson
Associate Professorial Lecturer L.E. Church *(Oral)*
Assistant Professors R.P. Altman, A.J. Slovin
Assistant Clinical Professors William Ferguson, J.J. Weinstein, F.B. Brandt, J.W. Canter, J.B. Harrell, L.R. Perna, S.M. Kirson, Fernando Sacasa *(Oral)*, R.D. Shapiro *(Oral)*, L.T. Bowles, A.G. Coran, J.D. Alford, C.A. Silva, R.L. Flax, R.R. Cameron
Clinical Instructors B.G. Brown, J.H. Sager, J.R. McClelland, G.E. White, Sheldon Holen *(Periodontics)*, B.S. Teunis

*303 **Clinical Clerkship** (15) Staff
12 weeks at Univ. and D.C. Gen. hosps.

378 **Advanced Surgery** (5) Staff
Participation in total patient care, including operative procedures under close supervision. 3 seniors; 4-week elective periods. Andrews Air Force Base Hosp. (September–May)

379 **Advanced Surgery** (5) Staff
Same as Surg 378. 3 seniors; 4-week elective periods. Wash. Hosp. Center. (September–May)

380 **Advanced Surgery** (5) Staff
Same as Surg 378. 3 seniors; 4-week elective periods. Univ. Hosp. (September–May)

381 **Advanced Surgery** (5) Staff
Same as Surg 378. 3 seniors; 4-week elective periods. Walter Reed Gen. Hosp. (September–May)

382 **Advanced Surgery** (5) Staff
Same as Surg 378. 3 seniors; 4-week elective periods. V.A. Hosp. (September-May)

383 **Advanced Surgery** (5) Staff
Same as Surg 378. 3 seniors; 4-week elective periods. Nat'l Naval Med. Center (September–May)

384 **Thoracic-Cardiovascular Surgery** (5) Adkins
Study of the basic principles used in thoracic and cardiovascular surgery. 2 seniors; 4-week elective periods. Univ. Hosp. and Clinic (September–May)

385 **Plastic Surgery** (5) Thompson
Participation in all activities, including preoperative and postoperative care, operating room procedures, clinical activities, conferences. Aesthetic

*Required for medical students.

surgery, head and neck cancer, maxillofacial trauma, hand surgery, congenital anomalies about the head and neck, and burns. 1 senior; 4-week elective periods. Univ. Hosp. and Clinic (September–May)

386 **Pediatric Surgery** (5) Randolph

Participation in an active, closely supervised surgical service for infants and children, including congenital defects, cardiac surgery, trauma, and neoplasms. 2 seniors; 4-week elective periods. Children's Hosp. (September–May)

387 **Plastic Surgery** (5) Thompson, Parsons

Experience comparable to a surgical internship with integral participation in all activities of the service, including preoperative and postoperative care, operating room procedures, outpatient clinics, and conferences. Basic principles of wounds and their management, aesthetic and reconstructive surgery, and congenital anomalies. 2 seniors; 4-week elective periods. Walter Reed Gen. Hosp. (September–May)

388 **Plastic Surgery** (5) Thompson

Participation in an active plastic surgery service, principally aesthetic surgery but also including other types of plastic surgery. Participation in outpatient clinics, operating room procedures, and conferences. 2 seniors; 4-week elective periods. Nat'l. Naval Med. Center (September–May)

389 **Surgical Preceptorship** (5) Iovine, McCune, Thistlethwaite, Isaacson

Participation in the care of general surgical patients as seen in private practice. 4 seniors; 4-week elective periods. (September-May)

390 **Extramural Surgery Elective** (arr.)

The Department arranges for students to spend one or more elective periods at other institutions. Students must have the approval of the Chairman of the Department. Staff

391 **Acute General Surgery** (5)

Participation in the evaluation and care of acute trauma and emergency situations at the Emergency Rooms. 2 seniors; 4-week elective periods. Univ. Hosp. and Wash. Hosp. Center (September–May)

392 **Peripheral Vascular Surgery** (5) Keshishian, Smyth

Study and application of vascular surgery. 1 senior; 4-week elective periods. Wash. Hosp. Center (September–May)

393 **Pediatric Cardiac Surgery** (5) McClenathan

Participation in the care and study of congenital heart disease. 1 senior; 4-week elective periods. Children's Hosp. (September–May)

394 **Surgical Immunology** (5 or 10) T. Alford

Methods of separating antigens from human tumors and their immunological effects in autologous and allogenic patients. Present techniques for tissue typing in potential organ recipients. 1 senior; 4- or 8-week elective periods. Surgical Research Lab., Warwick Bldg. (September–May)

395 **Experimental Surgery** (5) Joseph

Participation in existing research projects and experimental operative pro-

cedures; assigned reading. 2 seniors; 4-week elective periods. Surgical Research Lab., Warwick Bldg. (September–May)

399 **Disaster Medicine** (1) Pierpont

Emergency medical care; teaching films and discussion concerning management of "on the scene" trauma and mass casualty situations. (Fall)

Urology

Chairman: F.C. Derrick, Jr.

Professors L.R. Culbertson, F.C. Derrick, Jr.
Clinical Professors E.E. Ferguson, W.D. Jarman
Associate Professor Mitchell Edson
Associate Clinical Professors F.T. Reuter, H.A. Goldberg, Anthony Borski, F.J. Frensilli
Assistant Professors H.S. Semerdjian, R.L. Neville, Jr.
Assistant Clinical Professors Gilbert Ottenberg, G.R. MacDonald, R.C. Rhame, John Kenealy, George Dudas, H.J. Klapproth, R.E. Ware, W.L. Banfield III, I.S. Young, Chalon Rodriguez, E.H. Soifer, I.J. Spence, D.M. Seitzman, B.T. Mittemeyer, Irwin Shuman, D.T. Schwartz, C.W. Schmidt, F.B. Hendricks
Clinical Instructors Hernando Salcedo, Barbara Black

380 **Clinical Urology** (5) Reuter

Outpatient and diagnostic urology, cystoscopy and radiographic procedures. 1 senior; 4-week elective periods. Univ. Hosp. (January 28–March 24)

381 **Clinical Urology** (5) Derrick, Semerdjian

Observation of urologic conditions and procedures for diagnosis and treatment, radiologic and pathologic studies, endoscopy and surgery, collateral reading, weekly staff conference. 2 seniors; 4-week elective periods. Univ. Hosp. (September–May)

382 **Clinical Urology** (5) Derrick, Semerdjian

Observation of urologic conditions and procedures for diagnosis and treatment, radiologic and pathologic studies, endoscopy and surgery, collateral reading, weekly staff conference. 2 seniors; 4-week elective periods. V.A. Hosp. (December 31–May 19)

383 **Clinical Urology** (5) Derrick, Edson

Outpatient and diagnostic urology; cystoscopic and operative urology. 1 senior; 4-week elective periods. Univ. Hosp. (2 weeks) and Nat'l. Naval Med. Center (2 weeks) (September–May)

390 **Extramural Urology Elective** (arr.)

The Department arranges for students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

THE SCHOOL OF MEDICINE

Faculty and Staff of Instruction*

EMERITI

Theodore Judson Abernethy, *Professor Emeritus of Clinical Medicine*
B.S. 1925, Denison University; M.D. 1929, Johns Hopkins University

Errett Cyril Albritton, *Professor Emeritus of Physiology*
B.A. 1916, University of Missouri, Columbia; M.D. 1921, Johns Hopkins University

Harry Ford Anderson, *Professor Emeritus of Dermatology and Syphilology*
M.D. 1924, University of Cincinnati

Brian Brewer Blades, *Professor Emeritus of Surgery*
B.A. 1928, University of Kansas; M.D. 1932, Washington University

Walter Andrew Bloedorn, *Professor Emeritus of Medicine*
M.D. 1909, Creighton University; B.A. 1915, M.A. 1916, Sc.D. 1948, George Washington University

Thomas McPherson Brown, *Professor Emeritus of Medicine*
B.A. 1929, Swarthmore College; M.D. 1933, Johns Hopkins University

Dexter Means Bullard, *Professor Emeritus of Clinical Psychiatry*
Ph.B. 1920, Yale University; M.D. 1923, University of Pennsylvania

Frank Duncan Costenbader, *Professor Emeritus of Clinical Ophthalmology*
B.S. 1925, Hampden-Sydney College; M.D. 1929, University of Virginia

Jeremiah Keith Cromer, *Professor Emeritus of Clinical Obstetrics and Gynecology*
M.D. 1929, B.A. 1931, George Washington University

Henry Lauran Darner, *Professor Emeritus of Clinical Obstetrics and Gynecology*
B.A. 1916, Western Maryland College; M.D. 1920, Johns Hopkins University

Paul Frederick Dickens, *Professor Emeritus of Clinical Medicine*
M.D. 1908, University of Nashville

Samuel Mayer Dodek, *Professor Emeritus of Clinical Obstetrics and Gynecology*
B.A. 1923, George Washington University; M.D. 1927, Thomas Jefferson University; M.A. 1931, Case Western Reserve University

William Rankin Duryee, *Research Professor Emeritus of Pathology (Experimental), in Residence*
B.A. 1927, Ph.D. 1933, Yale University

James Albert Dusbabek, *Professor Emeritus of Clinical Obstetrics and Gynecology*
M.D. 1934, George Washington University

* The Faculty and Staff of Instruction listed here and at the head of each department is for the academic year 1972–73.

Clayton Bernard Ethridge, *Professor Emeritus of Medicine*
M.D. 1933, University of Virginia

Clarence Kendall Fraser, *Professor Emeritus of Clinical Obstetrics and Gynecology*
Ph.B. 1931, College of the Holy Cross; M.D. 1935, Tufts University

James Quincy Gant, Jr., *Professor Emeritus of Clinical Dermatology*
B.A. 1930, M.S. 1931, Ohio State University; M.D. 1935, Medical College of Virginia of Virginia Commonwealth University

Alec Horwitz, *Professor Emeritus of Clinical Surgery*
B.A. 1920, M.D. 1923, George Washington University; M.S. in Surg. 1927, University of Minnesota, Minneapolis-St. Paul

Hayden Kirby-Smith, *Professor Emeritus of Clinical Dermatology*
B.S. 1927, University of the South; M.D. 1937, George Washington University

Chester Elwood Leese, *Professor Emeritus of Physiology*
B.A. 1922, M.A. 1925, Ph.D. 1930, University of Iowa

Edward Lewis, *Professor Emeritus of Clinical Pediatrics*
M.D. 1918, George Washington University

Preston Alexander McLendon, *Professor Emeritus of Pediatrics*
B.S. 1913, Wake Forest University; M.D. 1915, Columbia University

Daniel Bruce Moffett, *Professor Emeritus of Otolaryngology*
B.A. 1910, University of Richmond; M.D. 1915, University of Maryland

Margaret Mary Nicholson, *Professor Emeritus of Clinical Pediatrics*
B.A. 1922, M.D. 1925, George Washington University

George Nordlinger, *Professor Emeritus of Clinical Obstetrics and Gynecology*
B.A. 1918, M.D. 1922, George Washington University

Leland Wilbur Parr, *Professor Emeritus of Bacteriology*
B.S. 1916, Ph.D. 1923, University of Chicago

Herbert Pollack, *Professor Emeritus of Clinical Medicine (Biochemistry)*
B.A. 1925, Washington and Lee University; M.D. 1929, Cornell University; Ph.D. 1933, University of Minnesota, Minneapolis-St. Paul

Frederick A. Reuter, *Professor Emeritus of Urology*
M.D. 1916, George Washington University

Benjamin Rones, *Professor Emeritus of Clinical Ophthalmology*
B.A. 1922, M.D. 1926, Johns Hopkins University

Ernest Alfred Watson Sheppard, *Professor Emeritus of Clinical Ophthalmology*
M.D., C.M. 1926, Queens University, Canada

Donald Harrison Stubbs, *Professor Emeritus of Clinical Anesthesiology*
B.A. 1929, M.A. 1931, M.D. 1932, George Washington University

Ira Rockwood Telford, *Professor Emeritus of Anatomy*
B.A. 1931, M.A. 1933, University of Utah; Ph.D. 1942, George Washington University

Thomas Carlton Thompson, *Professor Emeritus of Clinical Urology*
B.S. in Med., M.D. 1920, George Washington University

Janet Graeme Travell, *Professor Emeritus of Clinical Medicine*
B.A. 1922, Wellesley College; M.D. 1926, Cornell University

James Winston Watts, *Professor Emeritus of Neurological Surgery*
B.S. 1924, Virginia Military Institute; M.D. 1928, University of Virginia

Richard Wallace Wilkinson, *Professor Emeritus of Clinical Ophthalmology*
B.A. 1925, M.D. 1928, George Washington University; M.S. in Med. 1932, University of Pennsylvania

TIVE

e Samuel Abraham, *Associate Clinical Professor of Psychiatry and Behavioral Sciences*
B.S. 1938, Westminster College, Pennsylvania; M.D. 1950, George Washington University

Kristof Abraham, *Assistant Clinical Professor of Neurology*
M.D. 1952, Budapest University, Hungary

Fred Paul Abramson, *Assistant Research Professor of Pathology and of Pharmacology*
B.A. 1962, Case Western Reserve University; Ph.D. 1965, Ohio State University

R. Marshall Ackerman, *Clinical Instructor in Orthopaedic Surgery*
B.S. 1958, M.D. 1962, University of Pittsburgh

John Pletch Adams, *Professor of Orthopaedic Surgery and of Child Health and Development*
B.S. 1943, University of Missouri, Columbia; M.D. 1945, Washington University

Edward Adelson, *Associate Clinical Professor of Medicine*
B.S. 1943, M.D. 1947, Tufts University

Paul Charles Adkins, *Professor of Surgery*
B.A. 1944, M.D. 1948, Johns Hopkins University

Mohan Teckchand Advani, *Assistant Clinical Professor of Psychiatry and Behavioral Sciences*
B.S. 1955, Punjab University, India; M.B., B.S. 1960, Osmani University, India; D.P.M. 1964, Mysore University, India

Lewis Francis Affronti, *Professor of Microbiology*
B.A. 1950, M.A. 1951, State University of New York at Buffalo; Ph.D. 1958, Duke University

Cosimo Ajmone-Marsan, *Assistant Clinical Professor of Neurology*
M.D. 1942, University of Torino, Italy

Khawla Razzak Al-Abbousi, *Clinical Instructor in Child Health and Development*
M.B., Ch.B. 1966, University of Baghdad, Iraq

Julio Estuardo Alarcon, *Clinical Instructor in Obstetrics and Gynecology*
M.D. 1966, University of Trujillo, Peru

Chalom Albert, *Assistant Clinical Professor of Anesthesiology*
B.A. 1949, M.D. 1953, American University of Beirut, Lebanon

Dan George Albert, *Assistant Clinical Professor of Ophthalmology and of Child Health and Development*
B.S. 1938, Ohio State University; M.D. 1950, Syracuse University

Ernest Narinder Albert, *Associate Professor of Anatomy*
B.S. 1959, High Point College; M.S. 1963, University of Pittsburgh; Ph.D. 1965, Georgetown University

Solomon Naphtali Albert, *Associate Clinical Professor of Anesthesiology*
B.A. 1936, M.D. 1940, American University of Beirut, Lebanon

Yousef Al-Doory, *Assistant Professor of Epidemiology and Environmental Health*
B.S. 1945, University of Baghdad, Iraq; M.A. 1951, University of Texas at Austin; Ph.D. 1954, Louisiana State University, Baton Rouge

James David Alford, *Assistant Clinical Professor of Surgery*
B.A. 1959, M.D. 1966, University of North Carolina at Chapel Hill

Theodore Crandall Alford, *Associate Professor of Surgery*
B.A. 1944, Haverford College; M.D. 1947, Johns Hopkins University

Frank Duane Allan, *Professor of Anatomy*
B.S. 1947, M.S. 1949, University of Utah; Ph.D. 1954, Louisiana State University, Baton Rouge

James Curwood Aller, *Associate Professor of Clinical Engineering*
B.S. 1942, U.S. Naval Academy; M.A. 1949, M.E.S. 1954, Harvard University; D.Sc. 1968, George Washington University

Melvin Gustavus Alper, *Clinical Professor of Ophthalmology*
B.A. 1943, M.D. 1945, University of Virginia

Hubert Joseph Alpert, *Clinical Instructor in Medicine*
M.D. 1962, University of Illinois

Louis Katz Alpert, *Professor of Medicine*
B.S. 1928, M.D. 1932, Yale University

Seymour Alpert, *Professor of Anesthesiology; Vice President of the University, for Development*
B.A. 1939, Columbia University; M.D. 1943, State University of New York, Downstate Medical Center

Roy Peter Altman, *Assistant Professor of Surgery and of Child Health and Development*
B.A. 1955, Colgate University; M.S. 1958, University of Rochester; M.D. 1961, New York Medical College

Sirus Amiri, *Clinical Instructor in Child Health and Development*
M.D. 1956, University of Tehran, Iran

Harvey Hirsch Ammerman, *Clinical Professor of Neurological Surgery*
B.S. 1939, M.D. 1943, George Washington University

Arthur James Anderson, *Clinical Instructor in Medicine*
M.D. 1961, George Washington University

James Edward Anderson, *Clinical Instructor in Obstetrics and Gynecology*
B.A. 1955, Union College, Nebraska; M.D. 1965, Loma Linda University

Robert Harper Anderson, *Clinical Instructor in Child Health and Development*
M.D. 1946, Duke University

W. French Anderson, *Professorial Lecturer in Biochemistry (Genetics)*
B.A. 1958, M.D. 1963, Harvard University; M.A. 1960, University of Cambridge, England

William Staton Anderson, *Clinical Professor of Child Health and Development*
B.A. 1927, Duke University; M.D. 1931, Johns Hopkins University

John Lawrence Angel, *Professorial Lecturer in Anatomy and Anthropology*
B.A. 1936, Ph.D. 1942, Harvard University

Tatiana Antonovych, *Professorial Lecturer in Pathology*
M.D. 1941, University of Vienna, Austria

Leonard Philip Appel, *Clinical Instructor in Medicine*
B.A. 1953, M.D. 1957, New York University

Ronald Alan Apter, *Assistant Clinical Professor of Medicine*
M.D. 1958, George Washington University

Irwin Ardam, *Assistant Clinical Professor of Medicine*
B.A. 1948, New York University; M.D. 1954, New York Medical College

Bryan Arling, *Clinical Instructor in Medicine*
B.A. 1965, University of Minnesota, Minneapolis-St. Paul; M.D. 1969, Harvard University

Mansour Farid Armaly, *Professor of Ophthalmology*
B.A. 1947, M.D. 1952, American University of Beirut, Lebanon; M.S. 1957, University of Iowa

Philip Assatourians, *Assistant Professor of Medicine*
M.D. 1964, University of Tehran, Iran

Gilbert Paul August, *Assistant Professor of Child Health and Development*
B.S. 1958, City University of New York, City College; M.D. 1962, New York University

Gunter Josef Augustin, *Associate Clinical Professor of Radiology*
M.D. 1952, University of Heidelberg, Germany

Simon Leo Auster, *Assistant Clinical Professor of Psychiatry and Behavioral Sciences*
B.A. 1952, Yeshiva University; M.D. 1956, New York University

Gordon Avery, *Professor of Child Health and Development*
B.A. 1953, Harvard University; M.D. 1958, Ph.D. 1959, University of Pennsylvania

Julius Axelrod, *Distinguished Professor of Science*
B.S. 1933, City University of New York, City College; M.A. 1941, New York University; Ph.D. 1955, LL.D. 1971, George Washington University; Sc.D. 1966, University of Chicago

Eduardo Azcarate, *Assistant Clinical Professor of Child Health and Development (Psychology)*
B.A. 1965, M.A. 1967, Ph.D. 1970, Catholic University of America

Silas Babin, Jr., *Assistant Clinical Professor of Medicine*
M.D. 1951, Louisiana State University Medical Center, New Orleans

James Michael Bacos, *Associate Professor of Medicine*
B.S. 1948, Virginia Polytechnic Institute and State University; M.D. 1953, Duke University

Robert Emil Badwey, *Clinical Instructor in Obstetrics and Gynecology*
B.S. 1955, Franklin and Marshall College; M.D. 1959, University of Pittsburgh

Alfred Baer, *Associate Clinical Professor of Medicine*
B.A. 1942, Ohio State University; M.D. 1945, Johns Hopkins University

William Eldridge Bageant, *Assistant Clinical Professor of Anesthesiology*
M.D. 1939, George Washington University

John Martyn Bailey, *Professor of Biochemistry*
B.S. 1949, Ph.D. 1952, D.Sc. 1970, University of Wales

William Otis Bailey, Jr., *Associate Clinical Professor of Medicine*
M.D. 1940, George Washington University

George Ivan Baker, *Assistant Clinical Professor of Orthopaedic Surgery*
B.A. 1950, Syracuse University; M.D. 1954, State University of New York, Upstate Medical Center

Joseph Baker, *Associate Clinical Professor of Psychiatry and Behavioral Sciences*
B.A. 1940, Sc.D. 1970, Gettysburg College; M.D. 1944, Temple University

Guillermo Alfredo Balfour, *Assistant Clinical Professor of Child Health and Development*
M.D. 1959, University of Buenos Aires, Argentina

Giuseppe Balsamo, *Assistant Clinical Professor of Medicine*
Laurea in Medicinae Chirurgia 1952, University of Rome, Italy

Bernard Alvin Band, *Clinical Instructor in Obstetrics and Gynecology*
B.A. 1952, B.S. 1954, George Washington University; M.D. 1959, Howard University

William Landon Banfield III, *Assistant Clinical Professor of Urology*
B.A. 1954, Princeton University; M.D. 1958, George Washington University

Samuel Harvard Barboo, Jr., *Assistant Professorial Lecturer in Epidemiology and Environmental Health*
B.S. 1955, M.P.H. 1957, University of California, Berkeley; Dr.P.H. 1966, University of California, Los Angeles

Lewellys Franklin Barker, *Clinical Instructor in Medicine*
B.A. 1955, Princeton University; M.D. 1959, Johns Hopkins University

Ann Birnbaum Barnet, *Associate Professor of Neurology and of Child Health and Development*
B.A. 1951, Sarah Lawrence College; M.D. 1956, Harvard University

Solomon Efrem Barr, *Assistant Clinical Professor of Medicine*
B.A. 1951, M.D. 1954, George Washington University

John William Barrett, *Clinical Instructor in Neurological Surgery*
M.D. 1958, George Washington University

Robert Henry Barter, *Professor of Obstetrics and Gynecology*
B.S. 1937, M.D. 1940, University of Wisconsin, Madison

Werner Franklin Barth, *Associate Professor of Medicine*
B.A. 1956, Columbia University; M.D. 1960, Yeshiva University

Walter Earl Barton, *Professorial Lecturer in Psychiatry and Behavioral Sciences*
B.S. 1928, M.D. 1931, University of Illinois

Tali Bashour, *Assistant Professor of Medicine*
M.D. 1966, Damascus University, Syria

Charles Dewey Batchlor, *Assistant Research Professor of Clinical Engineering*
B.S. 1950, M.S. 1952, Howard University

Emil Herbert Bauersfeld, *Assistant Clinical Professor of Medicine*
B.A. 1932, M.D. 1935, George Washington University

Joseph Harold Baugh, *Associate Clinical Professor of Surgery*
B.S. 1949, Wilmington College, Ohio; M.D. 1953, St. Louis University

David Lionel Bazelon, *Clinical Professor of Psychiatry and Behavioral Sciences (Socio-legal Aspects)*
B.S. in Law 1931, Northwestern University; LL.D. 1966, Colby College

Harry Carl Beaver, *Clinical Instructor in Obstetrics and Gynecology*
B.S. 1959, Wheaton College, Illinois; M.D. 1963, George Washington University

Arthur Abbe Becker, *Clinical Instructor in Obstetrics and Gynecology*
B.S. 1956, City University of New York, City College; M.D. 1961, University of Iowa

Kenneth Louis Becker, *Associate Professor of Medicine*
B.A. 1952, University of Michigan; M.D. 1956, New York Medical College; Ph.D. 1963, University of Minnesota, Minneapolis-St. Paul

Norman Evans Beisaw, *Clinical Instructor in Orthopaedic Surgery*
B.A. 1958, Bowdoin College; M.D. 1962, New York University

Samuel Michael Belinsky, *Assistant Clinical Professor of Obstetrics and Gynecology*
B.A. 1955, University of Bridgeport; M.D. 1959, George Washington University

Leopold Bellak, *Clinical Professor of Psychiatry and Behavioral Sciences*
M.A. 1939, Boston University; M.A. 1942, Harvard University; M.D. 1944, New York Medical College

Robert Reid Belton, *Associate Clinical Professor of Medicine*
B.A. 1944, Willamette University; M.D. 1948, George Washington University

Ruth Boschwitz Benedict, *Associate Clinical Professor of Medicine*
B.A. 1935, Wellesley College; M.D. 1939, New York University

Thomas Arnold Bensinger, *Assistant Clinical Professor of Medicine*
B.S. 1963, Georgetown University; M.D. 1967, George Washington University

James Wood Benson, Jr., *Clinical Instructor in Medicine*
B.A. 1966, Stanford University; M.D. 1970, Harvard University

Peter Morris Berkman, *Assistant Professor of Medicine*
B.A. 1955, Harvard University; M.D. 1959, Columbia University

David Kip Berler, *Assistant Clinical Professor of Ophthalmology*
B.A. 1955, M.D. 1958, Cornell University

Theston Milton Berlin, Jr., *Special Lecturer in Child Health and Development*
B.A. 1958, Haverford College; M.D. 1962, Harvard University

Robert William Berliner, *Special Lecturer in Medicine (Renal Diseases)*
B.S. 1936, Yale University; M.D. 1939, Columbia University

Sidney Berman, *Clinical Professor of Psychiatry and Behavioral Sciences*
B.S. 1928, M.D. 1932, Georgetown University

Howard Nathan Bernstein, *Assistant Clinical Professor of Ophthalmology*
B.S. 1953, Bucknell University; M.D. 1957, State University of New York, Downstate Medical Center

Leon Bernstein, *Professor of Medicine*
B.S. 1939, Ph.D. 1957, University of London, England; L.R.C.P. 1949, Royal College of Physicians, England; M.R.C.S. 1949, Royal College of Surgeons, England

Solomon Rodney Bersack, *Assistant Clinical Professor of Radiology*
B.S. 1931, City University of New York, City College; M.D. 1935, New York University

Milton Berson, *Assistant Research Professor of Clinical Engineering*
B.E.E. 1950, City University of New York, City College; M.S. in Engr. 1965, George Washington University

Christopher Theodore Bever, *Associate Clinical Professor of Psychiatry and Behavioral Sciences*
B.A. 1940, M.D. 1943, Harvard University

Lewis Henry Biben, *Assistant Clinical Professor of Medicine*
M.D. 1949, Hahnemann Medical College

Peter Birk, *Associate Clinical Professor of Medicine*
B.A. 1955, Princeton University; M.D. 1959, Cornell University

Philip Stanley Birnbaum, *Associate Dean of the Medical Center, for Administrative Affairs*
B.S. in M.E. 1948, M.S. in M.E. 1949, Carnegie-Mellon University; B.C.E. 1954, Rensselaer Polytechnic Institute

Harvey Robert Birschbach, *Clinical Instructor in Medicine*
B.S. 1959, M.D. 1963, Marquette University

Barbara Onderchek Black, *Clinical Instructor in Urology*
B.A. 1962, Trinity College, District of Columbia; M.D. 1966, Georgetown University

Edward Black, *Assistant Clinical Professor of Psychiatry and Behavioral Sciences*
B.S. 1959, Dickinson College; M.D. 1963, New York Medical College

Emilie Annabelle Black, *Clinical Instructor in Child Health and Development*
B.S. 1942, M.D. 1945, George Washington University

Ethel Joan Blanchette-Mackie, *Associate Professorial Lecturer in Anatomy*
B.S. 1956, City University of New York, Queens College; M.S. 1959, New York University; Ph.D. 1965, Columbia University

Robert Allan Blum, *Clinical Instructor in Psychiatry and Behavioral Sciences*
B.S. 1959, M.S. 1960, Massachusetts Institute of Technology; M.D. 1964, University of Pennsylvania

Joe Morris Blumberg, *Clinical Professor of Pathology*
B.S. 1930, M.D. 1933, Emory University

Stanley Lorman Blumenthal, *Special Lecturer in Child Health and Development*
B.A. 1939, M.D. 1943, Johns Hopkins University

Robert Joel Bobys, *Clinical Instructor in Otolaryngology*
M.D. 1963, Georgetown University

George Pierce Bogumill, *Assistant Clinical Professor of Orthopaedic Surgery*
B.S. 1952, M.S. 1954, Ph.D. 1955, M.D. 1959, University of Wisconsin, Madison

Norman Kay Bohrer, *Clinical Instructor in Medicine*
M.D. 1957, George Washington University

Anthony Borski, *Associate Clinical Professor of Urology*
B.A. 1946, University of Denver; M.D. 1950, University of Colorado

Frank Joseph Borsody, *Clinical Instructor in Medicine*
B.A. 1955, George Washington University; M.D. 1960, University of Virginia

John Andrew Bottiglione, *Special Lecturer in Child Health and Development*
B.S. 1958, University of Notre Dame; M.D. 1962, Seton Hall University

John Henry Bouma, *Assistant Clinical Professor of Psychiatry and Behavioral Sciences*
B.A. 1948, B.S. 1949, M.B. 1952, M.D. 1953, University of Minnesota, Minneapolis-St. Paul

Isabella Blanche Bourne, *Associate Clinical Professor of Child Health and Development*
B.S. 1937, Morgan State College; M.D. 1941, Howard University

Lawrence Thompson Bowles, *Assistant Clinical Professor of Surgery*
B.A. 1953, M.D. 1957, Duke University; M.S. 1957, New York University

Carl David Brandt, *Assistant Professor of Child Health and Development (Microbiology)*
B.S. 1949, University of Connecticut; M.S. 1951, University of Massachusetts, Amherst; Ph.D. 1958, Harvard University

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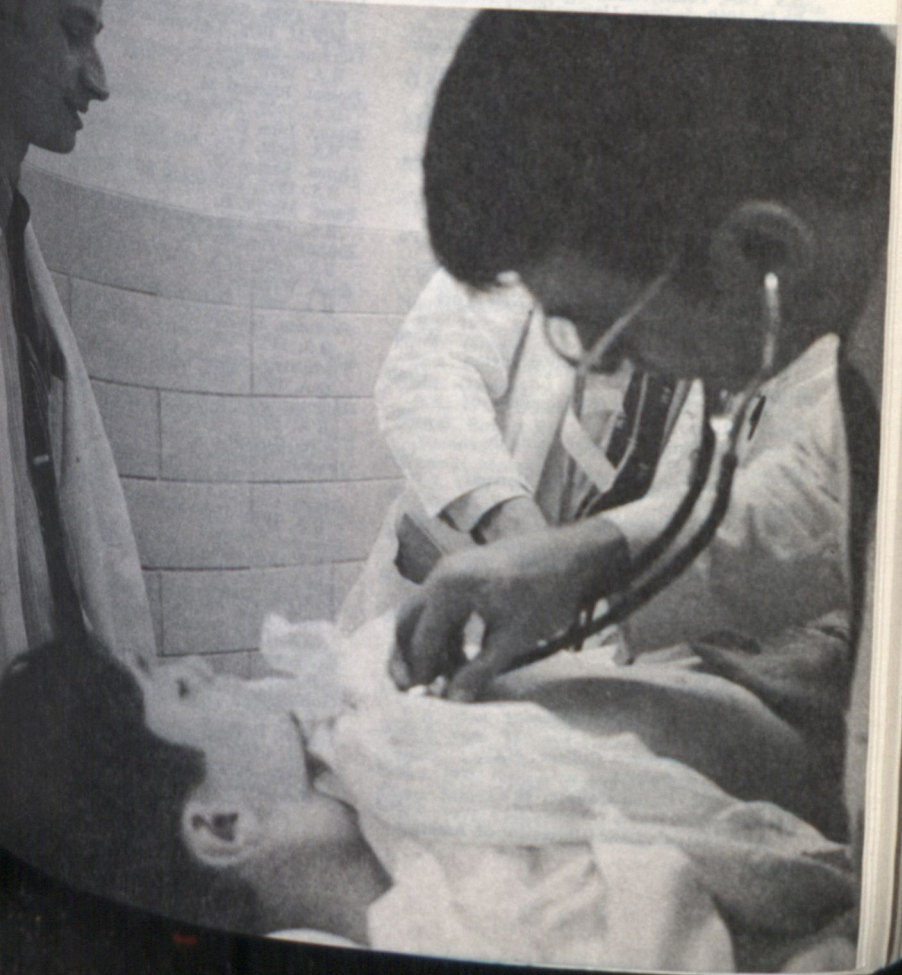

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B.A. 1971, Ohio Wesleyan University
Curry, Edward B. N.J.
B.S. 1963, Morehouse College
Davis, James E. Utah
B.A. 1971, Lafayette College
Daynes, Randall P. Utah
B.A. 1971, University of Utah
Dimond, Marlin L. N.C.
B.A. 1972, University of Utah
Donegan, Martha F.
B.A. 1971, University of North Carolina at Chapel Hill

Dorff, Robert J.
B.S. 1971, Georgetown University — Ohio
Doyle, Edward J., Jr.
B.S. in Engr. 1970, Duke University — Va.
Elliott, Daniel C.
B.A. 1971, Stanford University — Calif.
Exton, Eileen
B.S. 1971, University of Pittsburgh — Pa.
Farber, Stuart P.
B.A. 1971, George Washington University — N.Y.
Filipescu, Nicolae
Ph.D. 1957, University of Industrial Chemistry, Polytechnic Institute, Rumania — Va.
Fitzmaurice, Arthur G.
B.A. 1971, St. Anselm's College — Mass.
Footer, Robert D.
B.S. 1971, Ohio State University — Md.
Frank, Charles G.
B.S. 1970, Washington and Lee University — Md.
Freer, Everett C., Jr.
B.A. 1969, California Western University — Nev.
Gale, John H.
B.A. 1970, Duke University — D.C.
Gillespie, Dorothy L.
B.S. 1971, North Carolina Agricultural and Technical State University — N.C.
Giuli, Michael F.
B.S. 1971, University of Alabama — Va.
Gladden, Robert E.
B.A. 1971, Franklin and Marshall College — D.C.
Goldberg, Linn
B.S. 1970, University of Oregon — Ore.
Goldman, William D.
Attended George Washington University — D.C.
Gordon, Harriet L.
B.S. 1964, Howard University — Md.
Greenberg, Jay B.
B.A. 1971, George Washington University — N.Y.
Greenfield, Robert M.
B.A. 1968, George Washington University — Idaho
M.S. 1971, Georgetown University
Hall, Courtland J.
B.S. in Phar. 1966, University of Missouri, Kansas City — Mo.
Hanning, Ronald L.
B.S. 1967, Southern Illinois University — Kans.
Hart, Michael M.
B.S. 1964, Ph.D. 1970, George Washington University — Md.
Hauck, Kenneth W.
M.S. 1966, University of Michigan
B.S. 1968, U.S. Military Academy — N.Y.
Heron, William H.
B.A. 1971, Johns Hopkins University — D.C.
Horn, Frederick G.
B.A. 1971, University of California, Berkeley — Calif.
Howsley, Robert L.
B.S. 1971, University of Washington — Wash.
Hughes, Susan M.
B.A. 1971, Manhattanville College of the Sacred Heart — N.Y.
Jacobs, Marc H.
B.A. 1971, Washington University — Md.
Johnson, Glenn D.
B.A. 1970, Princeton University — D.C.
Morris, Marlene L.
B.A. 1962, Adelphi University — Md.
B.S. in Ch.E. 1964, M.S. in Ch.E. 1969, Massachusetts Institute of Technology
Naier, Cathryn I.
B.A. 1970, Elmira College — N.J.

Katzen, Harvey I.
Attended Georgetown University — Md.
Kellett, Mirle A., Jr.
B.A. 1969, Dartmouth College — Maine
Kessler, Fred B.
B.S. 1971, George Washington University — N.Y.
Kimbleton, Dennis P.
B.A. 1971, Rutgers University, New Brunswick — N.J.
Kofoed, Kenneth R.
B.S. 1971, University of Utah — Utah
Lancaster, Vere L.
B.S. 1971, University of Utah — Utah
Lautin, Andrew L.
B.A. 1970, Columbia University — N.Y.
Learn, Martin P.
B.A. 1971, University of Miami — D.C.
Leichner, John P.
B.S. 1965, St. Joseph's College, Pa. — Md.
M.S. 1967, Ph.D. 1970, Catholic University of America
London, Raymond G.
B.A. 1971, Clark University — Conn.
Lough, Frederick C., Jr.
B.S. 1970, U.S. Military Academy — N.Y.
Lyonga, Doris E.
B.S. 1969, Barat College of the Sacred Heart — West Cameroun
MacDougall, Monica K.
B.A. 1970, Case Western Reserve University — Va.
Maddi, Rosemarie
B.A. 1971, Mount Holyoke College — N.Y.
Maliniak, Keith K.
B.A. 1971, Franklin and Marshall College — Pa.
Mangasarian, Robert A.
B.A. 1971, Boston University — Md.
Mann, Jason
B.A. 1971, University of Pennsylvania — N.Y.
Marble, Richard D.
B.A. 1970, Claremont Men's College — Wash.
Marcus, Steven J.
B.A. 1970, University of Wisconsin, Madison — Calif.
Matsuoka, Lois Y.
B.A. 1971, Mills College — Hawaii
McCullars, George M.
B.S. in Agri. 1968, University of Florida — Fla.
M.S. 1971, George Washington University
Mehl, Raymond E.
B.S. 1965, Ph.D. 1971, University of Kansas — Kans.
Metheny, Jeffry A.
B.S. 1970, Geneva College — Pa.
Miles, John P., Jr.
B.A. 1964, Brown University — Ohio
Mills, Carl
B.A. 1971, Syracuse University — N.Y.
Mohn, Edward S., Jr.
B.A. 1968, George Washington University — Texas
Montgomery, Thomas R.
B.S. 1971, Bucknell University — Md.
Neuwelt, Clark M.
B.S. 1971, University of Wisconsin, Madison — Ind.
Ney, Alan B.
B.S. 1971, St. Lawrence University — D.C.
Ngumi, Paul G.
B.S. 1967, Central State University — Kenya
M.S. 1971, University of Dayton
Nicoll, Christine D.
B.A. 1965, M.A. 1969, Oxford University, England — England
Ph.D. 1970, University of London, England
Niechniedowicz, Frank E.
B.S. 1970, St. John's University, N.Y. — N.Y.
Norstrand, Lucille J.
B.A. 1971, Vassar College — N.Y.

Okehi, Chukuemeka O. Nigeria
B.A. 1971, University of Colorado
Okum, Neil H. Mich.
D.D.S. 1970, University of Detroit
Osborne, Robert W., Jr. Wash.
B.A. 1971, University of Washington
Page, Michael J. Mont.
B.A. 1971, University of Colorado
Paglen, Patrick G. N.Y.
B.S. 1971, U.S. Air Force Academy
Palmer, Richard N. N.M.
B.S. 1971, New Mexico State University
Patterson, Eugene B. Calif.
B.A. 1969, Stanford University
Peters, Jacob K. Calif.
B.A. 1971, Pacific College
Phair, Robert F. N.J.
B.S. 1967, Newark College of Engineering
J.D. 1971, Georgetown University
Phillips, William R. Wash.
B.A. 1971, University of Washington
Piepgrass, Sterling R. Utah
B.S. 1971, University of Utah
Reed, Allan P. N.Y.
Attended George Washington University
Rich, Deborah J. N.Y.
B.A. 1970, University of Pennsylvania
Richards, Peter C. Calif.
B.A. 1971, University of California, Los Angeles
Ross, Michael A. N.Y.
B.S. 1971, Dickinson College
Rothman, Barry S. Md.
B.A. 1971, George Washington University
Rucker, Richard D. Ariz.
B.A. 1969, M.S. 1970, University of Arizona
Saehoo, Smith Thailand
B.A. 1966, Columbia Union College
M.S. 1970, George Washington University
Safran, Julian E. Md.
Attended George Washington University
Schauer, Peter K. Conn.
B.S. 1971, University of Hartford
Schutt, David C. N.Y.
B.S. 1971, U.S. Air Force Academy
Scott, Thomas W. Va.
B.S. 1969, George Washington University
Seigel, Leonard J. N.J.
B.A. 1971, University of Rochester Calif.
Shibata, Carl S.
B.A. 1971, University of California, Los Angeles Maine
Shubert, Dennis L.
B.S. 1969, M.S. 1970, Tufts University Ill.
Sims, Edward G.
B.A. 1971, Northwestern University Calif.
Smith, Evelyn B.
B.A. 1971, University of California, Berkeley Utah
Smith, Wallace D.
B.A. 1971, Weber State College Calif.
Sorensen, James M.
B.S. 1971, University of California, Berkeley N.Y.
Spier, Ronald B.
B.A. 1970, New York University Conn.
Sveda, Sally A.
B.A. 1965, Smith College Ohio
M.S. 1968, Yale University
Swartz, Joel D. Idaho
B.S. 1971, Ohio State University
Tall, Roger H. N.Y.
Attended Brigham Young University
Thompson, Fitzroy N.
B.S. 1967, City University of New York, City College Conn.
Trigg, Michael E. N.Y.
B.A. 1971, Trinity College, Conn.
Trumbull, Donald Ohio
B.S. 1971, McGill University, Canada
Van Atta, Glenn B. Ohio
B.A. 1965, Ohio Northern University
Vangrov, Mark S. Md.
B.A. 1970, Miami University
Warden, Steven S. Md.
B.S. 1971, Muskingum College
Weiner, Jay H. Wash.
B.A. 1971, George Washington University
Wiesner, Don R. N.Y.
B.S. 1970, Oregon State University
Wile, Charles H. N.Y.
B.A. 1971, Duke University
Young, George Md.
B.S. 1971, Columbia University
Zinar, Lawrence C.
B.E., B.S. 1968, State University of New York at Stony Brook

THIRD YEAR

Abrahms, Eliot R. Conn.
B.A. 1966, University of Pennsylvania
Altman, Richard S., Jr. Pa.
B.A. 1970, Franklin and Marshall College
Amick, Roger W.Va.
B.B.A. 1970, Marshall University
Bacon, John R. Md.
B.S. 1970, George Washington University
Ball, John T. Calif.
B.A. 1970, University of Virginia
Balsley, Ellen J. Va.
B.A. 1967, Indiana University at Bloomington
Bane, Susan H. Md.
B.A. 1968, George Washington University
Barratt, Paul F. N.J.
B.A. 1969, Princeton University
M.M.S. 1972, Rutgers University, New Brunswick
Barton, John S. Wash.
B.A. 1969, Lewis and Clark College
B.S. in Med. 1972, University of South Dakota Md.
Basen, Walter B.
B.S. 1970, University of Maryland Calif.
Baska, John K.
B.A. 1970, George Washington University Wash.
Berlin, Gregory S.
B.A. 1970, University of Washington Calif.
Billing, Paul M. N.J.
B.A. 1970, Whitman College
Blumberg, Andrew M.
B.S. 1970, University of Wisconsin, Madison Md.
Boyd, James C.
Attended University of Maryland N.Y.
Burgess, Scott E.
B.A. 1970, George Washington University

Burtoff, Bruce D. D.C.
B.A. 1970, University of Pennsylvania
Callahan, Michael E. Utah
B.S. 1970, Brigham Young University
Camp, Gregory V. Ore.
B.S. 1968, University of Oregon
Clark, Thomas H. Va.
B.S. 1970, George Washington University
Cohn, Howard C. Pa.
B.S. 1968, University of Pittsburgh
Cornelius, Douglas H. Colo.
Attended University of Colorado
Cresswell, George F. Md.
Attended Washington and Lee University
Crotty, Nancy K. Ind.
B.S. 1968, University of Maryland
Danylevich, Alec N.Y.
B.A. 1969, Harvard University
B.Med.S. 1972, Dartmouth College
Donahue, George M. Conn.
B.S. 1964, Fairfield University
Donovan, Joseph W. N.Y.
B.A. 1969, Manhattan College
Downing, Terence P. Wash.
B.A. 1970, University of Washington
Eisner, Martin E. N.Y.
B.A. 1970, University of Wisconsin, Madison
Engleberg, Niels C. Md.
B.S. 1970, George Washington University
Falkowski, Walter S. N.J.
B.S. 1967, St. Peter's College
M.A. 1969, Princeton University
Faul, Gregory B. N.D.
B.S. in Med. 1972, University of North Dakota
Ferguson, Edwin E., Jr. Md.
B.S. 1966, University of Rochester
Finn, Peter V. Mass.
B.A. 1970, University of Massachusetts, Amherst
Furlow, Terrance G. Md.
Attended George Washington University
Gardner, Melinda M. D.C.
B.A. 1965, Duke University
Gloster, Robert C. Mass.
B.S. 1970, Georgetown University
Gluck, Rita K. Va.
B.A. 1968, New York University
Goldblatt, Robert S. N.Y.
B.A. 1970, George Washington University
Goldman, Steven L. Mass.
B.S. 1970, George Washington University
Gorin, Michael E. D.C.
B.A. 1970, Northwestern University
Greene, Michael A. D.C.
B.S. in E.E. 1964, State University of New York at Buffalo
Greenfield, Paul S. N.J.
B.A. 1970, University of Pennsylvania
Hair, Joyce E. Pa.
B.A. 1970, Hood College
Hall, Frank A. Ala.
B.A. 1970, Emory University
Hardy, James R. Wash.
B.A. 1962, B.S. 1964, University of Washington
Hardy, William R. Calif.
B.A. 1970, University of California, Riverside
Hartz, Leo M. Pa.
B.A. 1969, Pennsylvania State University
Henriksen, Gary L. Wash.
B.S. in Phar. 1970, University of Washington
Heron, Howard C., II Md.
B.A. 1970, George Washington University

Hirsch, Florie N.Y.
B.A. 1970, Barnard College
Hobbs, Charles L., III Del.
B.A. 1969, Yale University
Howard, Douglas R. Mass.
B.S. 1970, Brown University
Hurley, Michael S. Va.
B.S. 1962, College of the Holy Cross
D.D.S. 1966, Georgetown University
Insler, Harvey P. Fla.
B.S. 1969, Rensselaer Polytechnic Institute
Isaacson, Paul J. Md.
B.A. 1970, Johns Hopkins University
Jenkins, Roger C., Jr. Calif.
B.S. 1970, University of Washington
Kalu, Uduma O. Nigeria
B.S. 1967, Iowa State University of Science and Technology
M.S. 1969, Howard University
Kaplan, Jack O. N.Y.
B.S. 1970, George Washington University
Kass, Frederic H., III N.J.
B.A. 1970, Colgate University
Kelly, Gregory B. Conn.
B.S. 1970, University of Maryland
Kennedy, James J. Md.
B.A. 1969, Duke University
Kerr, Vicky E. S.C.
B.A. 1970, Boston University
Kestenbaum, David J. N.Y.
B.A. 1970, Hofstra University
Krakovitz, Robert W. Pa.
B.A. 1969, Pennsylvania State University
Kutcher, Leslie M. N.Y.
B.S. 1970, City University of New York, Brooklyn College
Laney, Steven R. Wash.
B.S. 1970, University of Washington
Lau, Mark M. Calif.
B.A. 1970, University of California, Berkeley
Lieberman, Jeffrey A. Ohio
B.A. 1970, Miami University
Little, Albert G. Md.
B.S. 1967, D.D.S. 1971, University of Maryland
London, David B. Nev.
B.A. 1970, George Washington University
Ludlow, Paul C. Calif.
B.S. 1970, Brigham Young University
Manart, Frank D. Calif.
B.A. 1969, University of Southern California
Mangiaracina, Thomas A. N.Y.
B.A. 1970, New York University
Marks, William A. N.Y.
B.A. 1969, St. Lawrence University
McCormick, Joseph P. N.Y.
B.A. 1969, Alfred University
McIntyre, Robert C. Wash.
B.S. 1969, Washington State University
Miller, Robert E. N.Y.
B.A. 1970, Hofstra University
Murray, Ives P. N.Y.
B.A. 1969, University of Colorado
Neslen, George Q. Calif.
B.A. 1967, Stanford University
Newman, Robert E. Md.
B.A. 1970, Lafayette College
Noguchi, Philip D. Calif.
B.A. 1970, University of California, Berkeley
Pagano, Samuel W. N.J.
B.A. 1970, Johns Hopkins University
Passeri, Ronald L. N.J.
B.A. 1970, Rutgers University, New Brunswick

Payes, William C. N.Y.
B.S. 1970, Syracuse University
Poole, Robert W. Md.
B.S. 1970, Dickinson College
Principi, Kathy L. Ohio
B.A. 1970, Rutgers University, New Brunswick
Rabinowitz, Asher D. D.C.
B.A. 1970, Yeshiva University
Radice, Peter A. Md.
B.A. 1970, Yale University
Remick, Ronald A. Ohio
B.A. 1970, Johns Hopkins University
Richardson, Bruce W. Wash.
B.A. 1969, University of Washington
B.S. in Med. 1972, University of South Dakota
Ross, Gary S. N.Y.
B.A. 1970, Colgate University
Rubin, Daniel J. Md.
B.A. 1960, Harvard University
Ph.D. 1967, New York University
Ruby, Jo-Anne B. D.C.
B.S. 1967, M.S. 1970, George Washington University
Sacks, Maury E. N.Y.
B.A. 1970, Lehigh University
Sarafan, Peter M. N.Y.
B.A. 1970, Amherst College
Sarsfield, Gregory R. Md.
B.S. 1968, George Washington University
Scalettar, Robert E. N.Y.
B.A. 1969, University of Wisconsin, Madison
Sexton, Robert L. Wash.
B.S. 1970, Gonzaga University
Silva, John S. R.I.
B.S. 1968, Providence College
Smith, Alan W. Md.
B.S. 1970, Carson-Newman College
Smith, Kenneth R. Fla.
Attended Florida Atlantic University
Starke, Peter R. N.Y.
B.A. 1970, Trinity College, Conn. Md.
Sternburg, Jon K. Colo.
B.A. 1970, Bowdoin College
Stevens, Kathleen Utah
B.A. 1970, University of Colorado
B.S. in Med. 1972, University of South Dakota
Taylor, Paul R. Ark.
B.A. 1970, Weber State College
Thomas, Katherine L. Tenn.
Attended University of Arkansas
Thompson, John M. Utah
B.S. 1970, Florida Southern University
Thomson, John W. Md.
B.S. 1970, Brigham Young University
Tievsky, Andrew L. N.Dak.
B.A. 1970, University of Rochester
Trenbeath, James M. D.C.
B.A. 1970, Macalester College
B.S. in Med. 1972, University of North Dakota
Trued, Sally J. Del.
B.A. 1970, Northwestern University
Valk, Thomas H. Pa.
B.S. 1969, Harvey Mudd College
Van Brakle, John D. Md.
B.S. 1970, Muhlenberg College
Van Osdel, Lewis A., III Mich.
B.A. 1968, University of Washington
Vorachek, Mary A. R.I.
B.A. 1962, University of Michigan
Whitfield, Peter W. Md.
B.A. 1969, University of Rhode Island
Wisotsky, Philip Conn.
B.A. 1970, Boston University
Yimoyines, Dean J. N.J.
B.A. 1969, Syracuse University
Zagorski, Joseph B.
B.A. 1969, University of Pennsylvania

FOURTH YEAR

Adams, Elizabeth G. Mass.
B.A. 1966, Wellesley College
Adkins, James W. Conn.
B.A. 1969, Wesleyan University
Aisner, Seena C. Mich.
B.S. 1969, Wayne State University
Bader, Robert F. Calif.
B.A. 1969, University of California, Los Angeles
Banis, Joseph C. Calif.
B.S. 1969, Loyola University of Los Angeles
Barbiere, Charles F. N.Y.
B.A. 1969, New York University
Bass, Bernard N. Mass.
B.A. 1969, George Washington University
Bentley, Wendell J. Utah
B.S. 1970, University of Utah
Bishop, Norman R. Md.
B.S. 1969, George Washington University
Bobrow, Nathan M. Md.
Attended George Washington University
Bogran, Luis Honduras
B.S. 1968, George Washington University
Bollinger, Bruce C. Colo.
B.S. 1969, George Washington University
Boxall, David W. Wis.
B.Arch. 1968, Carnegie-Mellon University
Boyd, Richard B. Mass.
Attended Boston University
Brantner, Brian D. Calif.
B.A. 1968, California Lutheran College Md.
Broughton, Warren L. Conn.
B.A. 1970, George Washington University
Burstein, Darrell H. Ohio
B.S. 1969, Trinity College, Conn.
Callihan, Thomas R. Wash.
B.A. 1969, Kenyon College
Ceder, Lenart C. Mich.
B.A. 1969, University of Washington
Chase, William D., Jr. Texas
B.A. 1969, University of Michigan
Coit, Alan S. N.J.
B.A. 1969, Colby College
Cooper, Wayne D. N.D.
B.A. 1969, Alfred University
Crandall, Theodore L. Md.
B.A. 1969, University of North Dakota
Cresswell, Dianne L. N.J.
B.A. 1968, Muskingum College
Cricco, Robert P. Pa.
B.S. 1969, Fairfield University
Crock, Thomas R. Ohio
B.A. 1969, Johns Hopkins University
Curfman, David R.
B.A. 1965, Columbia Union College
M.S. 1967, George Washington University Conn.
Defranzo, Anthony J., Jr.
B.S. 1969, Trinity College, Conn.

Dunner, Frederick J.
B.S. 1967, George Washington University — Md.
Earls, Stephen T.
B.A. 1970, George Washington University — Mass.
Ehrlich, Dion R.
B.A. 1969, Franklin and Marshall College — N.Y.
Feller, Patricia A.
B.A. 1969, Rutgers University, New Brunswick — N.J.
Fiaschetti, Frank L.
B.S. 1969, Muhlenberg College — N.Y.
Frist, Brian S.
B.S. 1969, American University — N.Y.
Funt, Loren S.
Attended George Washington University — Fla.
Gersh, Elliot S.
B.S. 1969, Ohio State University — Ohio
Gladstein, Geoffrey S.
B.A. 1969, University of Connecticut — Conn.
Gray, William C.
B.S. 1969, University of Maryland — Md.
Hanowell, Ernest D.
B.S. 1969, University of California, Davis — Calif.
Hanowell, Susan T.
B.A. 1969, Lycoming College — Md.
Harris, Jeffrey D.
B.A. 1968, Hofstra University — N.Y.
Hauptman, Alexander O.
B.A. 1967, American University — N.J.
Heller, Joel H.
B.S., B.Phar. 1968, Rutgers University, New Brunswick — N.J.
Hsieh, Robert C.
B.S. 1969, George Washington University — D.C.
Hunter, Bruce C.
B.S. 1969, Weber State College — Utah
Isaacs, Steven E.
B.S. 1967, St. Lawrence University — N.Y.
Javerbaum, Jeffrey S.
B.A. 1969, Cornell University — N.J.
Johnson, Mark Y.
B.S. 1969, University of Washington — Wash.
Johnson, Randall K.
B.A. 1969, University of Minnesota, Minneapolis-St. Paul — Minn.
Kaires, Pamela A.
B.S. 1969, State University of New York at Stony Brook — N.Y.
Kanda, Mireille B.
B.S. 1969, American University — Haiti
Kerns, Scott E.
B.S. 1969, University of Michigan — Mich.
Kohl, Cheryl A.
B.A. 1969, Duke University — N.J.
Kolb, Garry R.
B.S. 1968, California State Polytechnic College, San Luis Obispo — Calif.
Kuhn, Kerry L.
B.A. 1970, George Washington University — N.Y.
Lavine, Lawrence M.
B.S. 1965, Florida State University — Md.
Leeper, Willard S.
B.S. 1970, Brigham Young University — Calif.
Leva, Leo M.
B.A. 1968, Swarthmore College — Md.
Levin, Ronald H.
B.A. 1969, Clark University — Conn.
Lewin, Alan A.
B.A. 1969, Temple University — N.J.
Lewis, Allan J.
B.B.A. 1949, Texas Technological University — Ariz.
Lewin, David G.
B.S. 1969, University of Utah — Utah

Lipsett, Nathan W.
B.A. 1969, Kenyon College — N.J.
Liverett, David M.
B.A. 1969, University of Virginia — Md.
Luria, Alan S.
B.A. 1969, University of Michigan — Fla.
Mangan, Kenneth F.
B.S. 1969, University of Massachusetts, Amherst — Mass.
Manley, Michael D.
B.A. 1967, M.A. 1970, Sacramento State College — Calif.
Margules, Edward R.
B.A. 1968, University of California, Los Angeles — Calif.
Miller, Jeffrey P.
B.S. 1968, Randolph-Macon College — Miss.
Mugmon, Marc A.
Attended Georgetown University — Md.
Muleh, Salvatore
B.A. 1969, University of Connecticut — Conn.
Myles, Courtland L.
B.S. 1968, American University — D.C.
Partlow, Kenneth L.
Attended University of Washington — Wash.
Paszek, Michael J.
B.S. 1969, Trinity College, Conn. — Conn.
Paul, David A.
B.A. 1968, Rutgers University, New Brunswick — Md.
Pechan, B. Warren
B.A. 1969, Cornell University — N.Y.
Penhos, Juan C.
B.A. 1970, George Washington University — Argentina
Peters, John R.
B.A. 1969, New York University — N.Y.
Phillips, Arnold G.
B.A. 1962, M.S. 1963, Wayne State University — Md.
Powell, Richard M.
B.A. 1968, Temple University — Pa.
Prioleau, George R., Jr.
B.S. 1969, South Carolina State College — S.C.
Ripley, Robert C.
B.A. 1968, University of California, Berkeley — Calif.
Rosenthal, Jesse S.
B.A. 1969, George Washington University — N.Y.
Ross, Stuart E.
B.A. 1969, University of Pennsylvania — D.C.
Rumsey, Eugene W.
B.A. 1969, San Diego State College — Calif.
Saffer, Jeffrey M.
B.A. 1969, Dartmouth College — N.J.
Schade, Robert R.
B.A. 1969, Colgate University — N.Y.
Schliftman, Ronald C.
B.A. 1969, George Washington University — N.Y.
Schonberg, Allan
B.S. 1966, Bethany College, W.Va. — N.Y.
Shapiro, Harvey H.
B.A. 1965, Reed College — Ill.
Siemers, Paul T.
B.S. 1968, University of Illinois — Ill.
Silverman, Eugene D.
B.A. 1970, George Washington University — D.C.
Smith, Lois F.
B.S. 1969, Dickinson College — Va.
Smith, Richard J., Jr.
B.S. 1969, University of North Dakota — N.D.
Smolansky, Stephen J.
B.A. 1969, Temple University — N.Y.
Soben, Arthur L.
B.A. 1969, Rutgers University, New Brunswick — N.J.

Sokol, Scott K. N.Y.
B.A. 1969, Syracuse University
Spero, Charles R. N.Y.
B.S. 1969, Columbia University
Stang, Howard D. N.J.
B.A. 1969, Rutgers University, New Brunswick
Stewart, Barry C. Wash.
B.A. in Bus.Adm. 1962, University of Washington
Sullivan, Timothy P. N.J.
B.S. 1969, St. Peter's College
Sutton, Frederick J. Md.
B.A. 1969, Cornell University
Sweet, Ronald C. Ohio
B.S. 1969, Wright State University
Tamagna, Ellen I. Md.
B.A. 1969, Goucher College
Thomas, Jane S. Ohio
B.A. 1968, Cornell University
Thomas, Thomas, Jr. Pa.
B.A. 1967, M.S. 1969, Pennsylvania State University
Travers, Charles K., Jr. Md.
B.S. 1969, University of Maryland
Tvedt, Robert A. Calif.
B.A. 1969, Stanford University
Uman, Howard M. Mass.
B.A. 1969, Amherst College
Van de Water, Donald T. Fla.
B.S. 1969, George Washington University
Van der Werf, Joseph N. Pa.
B.A. 1969, Duke University
Van Meter, Keith Wash.
B.A. 1963, Miami University
Villarreal, Fernando A. Mexico
B.A. 1970, George Washington University
Wex, Timothy G. Wis.
B.A. 1969, Johns Hopkins University
Wilkenfeld, Morris J. N.J.
B.A. 1969, Lafayette College
Wilson, Douglas D. Ohio
B.S. 1969, Wright State University
Wilson, Stephen C. Calif.
B.S. 1969, University of Southern California
Wright, Kenneth J. Conn.
B.S. 1969, Trinity College, Conn.
Yates, Anthony P. Pa.
B.A. 1969, St. Vincent College
Yingling, Kae S. Md.
B.S. 1969, University of Maryland
Yu, Elmer Del.
B.A. 1968, Plymouth State College
Zarchy, Thomas M. N.Y.
B.S. 1969, Trinity College, Conn.

Summaries of Registration 1972–73

NUMBER OF REGISTRANTS

Class entering 1972	146	Class entering 1970	120
Class entering 1971	130	Class entering 1969	122

GEOGRAPHICAL DISTRIBUTION OF STUDENTS

Alabama	2	New Jersey	44
Arizona	3	New Mexico	2
Arkansas	1	New York	93
California	41	North Carolina	3
Colorado	4	North Dakota	4
Connecticut	25	Ohio	16
Delaware	3	Oregon	2
District of Columbia	28	Pennsylvania	21
Florida	7	Rhode Island	3
Hawaii	1	South Carolina	2
Idaho	3	South Dakota	1
Illinois	4	Tennessee	2
Indiana	2	Texas	23
Kansas	3	Utah	1
Maine	3	Vermont	17
Maryland	84	Virginia	21
Massachusetts	14	Washington	1
Michigan	7	West Virginia	2
Minnesota	1	Wisconsin	1
Mississippi	1	Argentina	1
Missouri	2	England	1
Montana	1	Haiti	1
Nevada	3	Honduras	1

Hong Kong	1
Kenya	1
Liberia	1
Mexico	1
Nigeria	3
Sierra Leone	1
Thailand	1
West Cameroun	1

INSTITUTIONS IN WHICH SCHOOL OF MEDICINE STUDENTS EARNED DEGREES

Adelphi University	1
Akron, University of	1
Alabama, University of	1
Alfred University	2
American University	4
Amherst College	2
Arizona, University of	2
Assumption College, Mass.	1
Barat College of the Sacred Heart	1
Barnard College	2
Bennett College, N.C.	1
Bethany College, W.Va.	1
Boston University	3
Bowdoin College	1
Bradley University	1
Brigham Young University	7
Brown University	3
Bucknell University	5
California Lutheran College	1
California State Polytechnic College, San Luis Obispo	2
California, University of:	
Berkeley	10
Davis	2
Irvine	1
Los Angeles	4
Riverside	1
Santa Barbara	1
California Western University	1
Carleton College	1
Carnegie-Mellon University	1
Carson-Newman College	2
Case Western Reserve University	1
Catholic University of America	1
Central State University	3
Chestnut Hill College	1
Claremont Men's College	1
Clark University	1
Colby College	2
Colgate University	1
Colorado, University of	5
Columbia Union College	4
Columbia University	2
Connecticut, University of	3
Cornell University	3
Dartmouth College	6
Dayton, University of	6
Delaware, University of	1
Detroit, University of	1
Dickinson College	3
Duke University	10
Eisenhower College	1
Elmira College	1
Emory University	1
Fairfield University	3
Federal City College	1
Florida Southern University	1
Florida State University	1
Florida, University of	1
Fordham University	1
Franklin and Marshall College	4
Geneva College	1
George Washington University	60
Georgetown University	5
Gettysburg College	1
Gonzaga University	1
Goucher College	1
Hartford, University of	2
Harvard University	4
Harvey Mudd College	1
Hiram College	1
Hobart College	1
Hofstra University	3
Holy Cross, College of the	2
Hood College	1
Howard University	3
Illinois, University of	1
Indiana University at Bloomington	2
Iowa State University of Science and Technology	1
Johns Hopkins University	6
Kalamazoo College	1
Kansas, University of	2
Kenyon College	2
Lafayette College	3
Lehigh University	1
Lewis and Clark College	1
London, University of, England	1
Loyola College	1
Loyola University of Los Angeles	1
Lycoming College	1
Macalester College	1
Manhattan College	1
Manhattanville College of the Sacred Heart	2
Marshall University	1
Mary Manse College	1
Maryland, University of	12
Massachusetts Institute of Technology	1

Massachusetts, University of, Amherst	2
McGill University, Canada	1
Miami University	4
Miami, University of	2
Michigan, University of	7
Middlebury College	1
Mills College	1
Minnesota, University of, Minneapolis-St. Paul	1
Missouri, University of, Kansas City	1
Morehouse College	1
Mount Holyoke College	2
Mount Union College	1
Muhlenberg College	2
Muskingum College	2
Newark College of Engineering	1
New Mexico State University	1
New York, City University of:	
Brooklyn College	1
City College	3
New York, State University of:	
at Albany	2
at Buffalo	2
at Stony Brook	2
New York University	11
North Carolina Agricultural and Technical State University	1
North Carolina, University of, at Chapel Hill	1
North Dakota, University of	4
Northwestern University	5
Occidental College	1
Ohio Northern University	1
Ohio State University	3
Ohio Wesleyan University	1
Oregan State University	1
Oregon, University of	2
Oxford University, England	1
Pacific College	1
Pennsylvania State University	5
Pennsylvania, University of	10
Pittsburgh, University of	2
Plymouth State College	1
Polytechnic Institute, University of Industrial Chemistry, Rumania	1
Princeton University	4
Providence College	1
Purdue University	3
Randolph-Macon College	1
Reed College	1
Rensselaer Polytechnic Institute	2
Rhode Island, University of	1
Rochester, University of	
Rutgers University, New Brunswick	
Sacramento State College	
St. Anselm's College	
St. John's University, N.Y.	
St. Joseph's College, Pa.	
St. Lawrence University	
St. Olaf College	
St. Peter's College	
St. Vincent College	
San Diego State College	
Smith College	
South Carolina State College	
South Dakota, University of	
Southern California, University of	
Southern Illinois University	
Stanford University	
Stetson University	
Swarthmore College	
Syracuse University	
Talladego College	
Temple University	
Texas Technological University	
Texas, University of, at Austin	
Trinity College, Conn.	
Trinity College, D.C.	
Tufts University	
Tulane University of Louisiana	
Union College, N.Y.	
U.S. Air Force Academy	
U.S. Military Academy	
Utah State University	
Utah, University of	
Vassar College	
Villanova University	
Virginia, University of	
Washington and Jefferson College	
Washington and Lee University	
Washington State University	
Washington University	
Washington, University of	
Wayne State University	
Weber State College	
Wellesley College	
Wesleyan University	
Western Maryland College	
Wheaton College	
Whitman College	
Wisconsin, University of, Madison	
Wright State University	
Wyoming, University of	
Yale University	
Yeshiva University	

Number of college graduates 491

Number of Institutions represented 194

Recipients of the Degree of Doctor of Medicine, May 28, 1972

Name, State of Residence, Degrees Held	Internship and Residency Appointments*
Anthony Wayne Adams, Virginia B.S. 1968, Virginia Polytechnic Institute and State University	†Martin Army Hospital, Fort Benning, Ga.
Pedro Antonio de Alarcón, Guatemala B.A. 1968, Harvard University	Washington Hospital Center, Washington, D.C.
Rodger William Althoff, Ohio B.A. 1968, Kent State University	District of Columbia General Hospital, Washington, D.C.
Bruce Jorge Ammerman, Maryland B.A. 1969, Case Western Reserve University (With Distinction)	District of Columbia General Hospital, Washington, D.C.
Thomas Annos, Delaware B.A. 1968, University of Pennsylvania	Thomas Jefferson University Hospital, Philadelphia, Pa.
Matthew Norman Apter, Connecticut B.S. 1968, Trinity College, Conn.	Ohio State University Hospital, Columbus, Ohio
Roy Jay Apter, Wisconsin B.A. 1968, University of Wisconsin, Madison	Boston City Hospital, Boston, Mass.
Margaret Edna Barnard, Canada B.S. 1967, Dalhousie University of Canada (With Distinction)	Western Pennsylvania Hospital, Pittsburgh, Pa.
Michael Edgar Beall, North Dakota B.A. 1968, Ohio Wesleyan University	District of Columbia General Hospital, Washington, D.C.
Stuart Alan Becker, New Jersey B.A. 1968, Lafayette College	†Beth Israel Medical Center, New York, N.Y.
Stuart Kenneth Bergman, New Jersey B.A. 1968, University of Virginia	Washington Hospital Center, Washington, D.C.
Marc Karl Binder, Pennsylvania B.S. 1969, Pennsylvania State University	Washington Hospital Center, Washington, D.C.
Kathleen Asyia Bis, New Jersey B.S. 1968, George Washington University	†George Washington University Hospital, Washington, D.C.
Robert Alan Blanar, Maryland B.S. 1968, George Washington University	Sacramento Medical Center, Sacramento, Calif.
Steven Paul Bondell, New York B.S. 1968, City University of New York, City College (With Distinction)	George Washington University Hospital, Washington, D.C.
Ronald Ralph Brancaccio, New York B.S. 1968, Fairfield University	Lenox Hill Hospital, New York, N.Y.
Robert Carroll Bransfield, New Jersey B.A. 1968, Rutgers University, New Brunswick	†Sheppard and Enoch Pratt Hospital, Towson, Md.
Charles Michael Briggs, Virginia B.A. 1965, University of Pennsylvania	Washington Hospital Center, Washington, D.C.
Darrell Arthur Campbell, Jr., Michigan B.S. 1968, Michigan State University (With Distinction)	University of Michigan Affiliated Hospitals, Ann Arbor, Mich.
Michael Anthony Cerruti, California B.A. 1966, University of California, Berkeley	Mount Zion Hospital, San Francisco, Calif.
Donald Clark Chapin, Maryland B.A. 1968, Tufts University	University Hospital of San Diego County, San Diego, Calif.
Elaine Luehrs Cockerham, Missouri B.A. 1967, Valparaiso University	Children's Hospital National Medical Center, Washington, D.C.
John Albert Cowin, New York B.A. 1968, Gettysburg College	District of Columbia General Hospital, Washington, D.C.
J Carl Craft, Utah B.A. 1968, California Western University	Milwaukee Children's Hospital, Milwaukee, Wis.
Stephen Pinkney Daines, Utah B.S. 1970, Utah State University	†George Washington University Hospital, Washington, D.C.
Joseph Terence Daly, California B.A. 1967, University of California, Davis	Orange County Medical Center, Orange, Calif.

* Appointments listed here are Internships, except those preceded by a dagger (†), which are Residencies.

Name, State of Residence, Degrees Held	Internship and Residency Appointments*
Christopher James Davis, California B.S. 1968, Massachusetts Institute of Technology	George Washington University Hospital, Washington, D.C.
Paul Damon De Figard, Portugal B.S. 1966, Stanford University	Children's Hospital National Medical Center, Washington, D.C.
Carlos Ricardo Diaz, Maryland B.A. 1968, Johns Hopkins University	Veterans Administration Hospital, Washington, D.C.
Mary McStocker Donaldson, Maryland B.A. 1968, Sweet Briar College	Washington Hospital Center, Washington, D.C.
Dennis John Donohue, Maryland B.S. 1966, St. John's University, N.Y.	Walter Reed General Hospital, Washington, D.C.
Leonard David Ehrlich, New York B.A. 1968, City University of New York, Hunter College	Montefiore Hospital, Bronx, N.Y.
Allan Melvin Eisenbaum, New York B.A. 1969, George Washington University	Maimonides Hospital, Brooklyn, N.Y.
Kenneth Craig Elam, New Jersey B.S. 1968, Muhlenberg College	†William A. Shands Teaching Hospital, Gainesville, Fla.
John Hubert Exner, Idaho B.S. 1968, College of Idaho	University of Utah Affiliated Hospitals, Salt Lake City, Utah
Anne Hood Fine, California B.A. 1969, George Washington University	Hospital of the Good Samaritan Medical Center, Los Angeles, Calif.
Sherman Sol Fox, New Jersey B.A. 1968, Johns Hopkins University	George Washington University Hospital, Washington, D.C.
John Michael Franklin, Washington B.S. 1968, University of Washington	Virginia Mason Hospital, Seattle, Wash.
Britton Lee Georges, Washington B.S. 1968, University of Washington	University of Kentucky Medical Center, Lexington, Ky.
Vito Anthony Giannuzzi, New York B.S. 1968, George Washington University	Children's Hospital National Medical Center, Washington, D.C.
Robert Lawrence Goldman, Maryland B.A. 1968, University of Pennsylvania	District of Columbia General Hospital, Washington, D.C.
Richard Craig Griffiths, Virginia B.S. 1968, Michigan State University	U.S. Naval Hospital, Oakland, Calif.
Maxwell Alan Helfgott, Maryland B.A. 1968, Grinnell College	St. Vincent's Hospital and Medical Center, New York, N.Y.
Roberta Katlan Helfgott, Maryland B.S. 1968, Simmons College	St. Vincent's Hospital and Medical Center, New York, N.Y.
Robert John Hunter, Pennsylvania B.A. 1968, Franklin and Marshall College	Geisinger Medical Center, Danville, Pa.
Steele Raymond Johnson, Washington B.A. 1966, University of Washington	†George Washington University Hospital, Washington, D.C.
Raymond Edward Joseph, Ohio B.S. 1968, Ohio State University	Ohio State University Hospital, Columbus, Ohio
Randolph Wade Juel, Washington B.A. 1968, University of Washington	Good Samaritan Hospital and Medical Center, Portland, Ore.
Stuart Suchin Kassan, New York B.A. 1968, Case Western Reserve University	Grady Memorial Hospital, Atlanta, Ga.
Jeffrey Ira Katz, New York B.A. 1968, Clark University	District of Columbia General Hospital, Washington, D.C.
Jay Everett Katzen, Maryland B.A. 1967, George Washington University	Washington Hospital Center, Washington, D.C.
Joseph H. Kaufman, New York B.A. 1963, New York University	Good Samaritan Hospital, Phoenix, Ariz.
Michael Alan Kessler, New Jersey B.A. 1968, Rutgers University, New Brunswick	Long Island Jewish Medical Center, New Hyde Park, N.Y.
Brenda Robin Kiessling, Virginia B.A. 1962, Oberlin College M.A. in Ed. 1964, George Washington University	Emanuel Hospital, Portland, Ore.

* Appointments listed here are Internships, except those preceded by a dagger (†), which are Residencies.

Name, State of Residence, Degrees Held	Internship and Residency Appointments*
Richard Reynolds Kimball, California B.A. 1967, University of California, Riverside	Good Samaritan Hospital, Phoenix, Ariz.
Don Robert King II, California B.S. 1968, University of Redlands	Ohio State University Hospital, Columbus, Ohio
Joy Dent King, Washington B.S. 1968, University of Washington	†Ohio State University Hospital, Columbus, Ohio
Richard Leland Kirby, Delaware B.A. 1968, University of Delaware	Wilmington Medical Center, Wilmington, Del.
Homer Ellsworth Knudson, Virginia B.S. 1968, Brigham Young University	†George Washington University Hospital, Washington, D.C.
George Matthew Korengold, Maryland B.A. 1968, University of Pennsylvania	Children's Hospital National Medical Center, Washington, D.C.
Paul Howard Kravitz, New York B.S. 1968, George Washington University	Temple University Hospital, Philadelphia, Pa.
Michael Joseph Krzyzkowski, New Jersey B.S. 1968, Wagner College	†Hunterdon Medical Center, Flemington, N.J.
Stuart Paul Leventhal, New Jersey B.S. 1968, University of Pittsburgh	Lenox Hill Hospital, New York, N.Y.
Alan Kiva Lichtenstein, New York B.A. 1968, City University of New York, Brooklyn College	Montefiore Hospital, Pittsburgh, Pa.
Jacqueline Weil-Malherbe Lichtenstein, Maryland B.A. 1968, Antioch College	Western Psychiatric Institute and Clinic, Pittsburgh, Pa.
Julian Marc Loube, Maryland B.A. 1967, George Washington University	†George Washington University Hospital, Washington, D.C.
Steven Daniel Macht, Maryland B.S. 1966, D.D.S. 1969, University of Maryland	District of Columbia General Hospital, Washington, D.C.
William Preston Magee, Jr., New Jersey D.D.S. 1969, University of Maryland	University of Virginia Hospital, Charlottesville, Va.
Edward David Marion, New York B.A. 1969, George Washington University	†Yale-New Haven Medical Center, New Haven, Conn.
Patrick John McCarthy, Maryland B.A. 1968, LaSalle College	Washington Hospital Center, Washington, D.C.
James Horner McClenathan, Maryland	University of Michigan Affiliated Hospitals, Ann Arbor, Mich.
Edison Hiroyuki Miyawaki, Hawaii B.S. 1959, M.S. 1964, Johns Hopkins University	Queen's Medical Center, Honolulu, Hawaii
Ronald Peter Monteverde, New York B.S. 1968, St. Peter's College	Evanston Hospital, Evanston, Ill.
James Henry Mowery, Illinois B.A. 1968, Northwestern University	†Northwestern University Medical Center, Chicago, Ill.
Wayne Coleman Nickens, District of Columbia B.S. 1968, Howard University	†Freedman's Hospital, Washington, D.C.
Robert Stephen Nierman, Massachusetts B.A. 1968, Boston University	Rhode Island Hospital, Providence, R.I.
Donald Eugene Noble, Pennsylvania B.A. 1968, George Washington University	Washington Hospital Center, Washington, D.C.
Corwin Anson Olds, California B.S. 1947, U.S. Naval Academy B.S. in M.E. 1955, M.S. in M.E. 1956, U.S. Naval Postgraduate School	†George Washington University Hospital, Washington, D.C.
Michael Oliff, New Jersey B.A. 1968, Rutgers University, New Brunswick	University of Kentucky Medical Center, Lexington, Ky.
Ronald John Orman, Montana	Lloyd Noland Hospital, Fairfield, Ala.
Frederick William Parker III, Pennsylvania B.S. 1968, University of Scranton	District of Columbia General Hospital, Washington, D.C.

* Appointments listed here are Internships, except those preceded by a dagger (†), which are Residencies.

Name, State of Residence, Degrees Held	Internship and Residency Appointments*
Michael Lane Pearson, Washington B.S. 1968, Washington State University	Orange County Medical Center, Orange, Calif.
Dennis Frederick Peck, Washington B.A. 1968, University of Washington	University of New Mexico Affiliated Hospitals, Albuquerque, New Mexico
Harold Crockett Pillsbury III, Maryland B.A. 1970, George Washington University	North Carolina Memorial Hospital, Chapel Hill, N.C.
Thomas Roger Powell, California B.A. 1968, Boston University	Orange County Medical Center, Orange, Calif.
Richard Brian Reff, Maryland B.A. 1969, George Washington University	Mount Zion Hospital, San Francisco, Calif.
Martha Rotstein, Massachusetts B.S. 1968, Simmons College	Boston University Hospital, Boston, Mass.
Joseph Henry Schenk, Maryland B.A. 1968, LaSalle College	U.S. Naval Hospital, Portsmouth, Va.
Chrisman George Scherf, New York B.S. 1968, Duke University	University Hospital of San Diego County, San Diego, Calif.
Robert William Schulz, Florida	Queen's Hospital Center, Honolulu, Hawaii
Michael Carl Schweitz, Maryland B.A. 1969, George Washington University	George Washington University Hospital, Washington, D.C.
Shalom Daniel Seltzer, Virginia	The New York Hospital-Cornell Medical Center, New York, N.Y.
Thomas Lawton Shreeve, Maryland B.A. 1968, Franklin and Marshall College	District of Columbia General Hospital, Washington, D.C.
Allen Robert Sklaver, Connecticut B.A. 1968, Williams College	Hartford Hospital, Hartford, Conn.
Seth William Snover, Pennsylvania B.S. 1968, Muhlenburg College	Geisinger Medical Center, Danville, Pa.
, Jerry Wayne Sonkens, Iowa B.S. 1967, Brigham Young University M.S. 1968, George Washington University	District of Columbia General Hospital, Washington, D.C.
Thomas Fildane Street, New Jersey B.S. 1968, John Carroll University	District of Columbia General Hospital, Washington, D.C.
Mark Wayne Surrey, District of Columbia B.S. 1968, University of Pittsburgh	U.C.L.A. Center for the Health Sciences, Los Angeles, Calif.
Laird Strickler Swensen, Utah B.A. 1968, Brigham Young University	San Francisco General Hospital, San Francisco, Calif.
Franz Carl Théard, Haiti B.A. 1968, Catholic University of America	District of Columbia General Hospital, Washington, D.C.
Charles Edward Thompson, Jr., Washington B.A. 1968, University of Washington	Orange County Medical Center, Orange, Calif.
Stephen Talmage Thomson, Utah B.S. 1968, Brigham Young University	Latter-Day Saints Hospital, Salt Lake City, Utah
Abigail Gertrude Thornton, District of Columbia B.S. 1965, M.S. 1967, George Washington University	U.C.L.A. Center for the Health Sciences, Los Angeles, Calif.
Richard James Warchol, Massachusetts B.A. 1967, Millikin University	George Washington University Hospital, Washington, D.C.
David Henry Winston, New York B.A. 1968, State University of New York at Binghamton	North Shore Hospital, Manhasset, N.Y.
Larry Gene Zimmerman, Colorado B.S. 1968, Colorado State University	Good Samaritan Hospital, Phoenix, Ariz.

* Appointments listed here are Internships, except those preceded by a dagger (†), which are Residencies.

APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subject to change in connection with the establishment of judicial processes. Bulletins and handbooks incorporating any changes will be issued as appropriate.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on October 19, 1968:

Whereas, safety and order are essential preconditions of the learning process, and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection of free speech and freedom of assembly, and to safeguarding the right of lawful protest on campus; and is committed equally to maintaining the peace and safety of the campus, in the knowledge that all rights are in jeopardy when violence and civil disorder prevail over law and reason;

Now, therefore, be it resolved by the Senate of The George Washington University: that in the event a demonstration at this University exceeds the bounds of free assembly and lawful advocacy, and demonstrators are engaging in unlawful acts which cause or imminently threaten injury to persons or property, or which obstruct or interfere with normal and necessary University activities, this body affirms the authority of the President, or other University officials designated to act in his absence, to take such reasonable steps, if possible after consultation with the Chairman of the Executive Committee of the University Senate* and the President of the Student Body, as are required to restore and preserve order; including, if deemed necessary and appropriate, suspension of students or faculty engaging in such acts, and use of such law enforcement personnel as are needed to effect the removal, arrest, and prosecution of law violators. Any such suspension shall be reviewed by an appropriate tribunal as soon after order is restored as is practicably possible.

The following was approved by the University's Board of Trustees on October 1968:

Any student suspended from The George Washington University on the bounds of exceeding the bounds of free assembly and lawful advocacy shall have his suspension reviewed by the Hearing Committee on Student Affairs† of the George Washington University as soon after order is restored as is practicably possible.

* The University Senate has been renamed the Faculty Senate.
† The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

The following resolution, submitted by the Student Life Committee, wa approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its tradition commitment to freedom of expression (a) by continuing to permit busines and government organizations which are recruiting employees to conduct thei activities at designated places on campus, and (b) by placing no obstacle t students who may wish to protest the presence of such recruiters, provided however, that such protest shall be orderly and shall not impede or disrup the recruiter in his activities.

The University affirms its place as a forum for the free exchange of idea (a) by assuring that guests invited to speak on this campus at duly schedule meetings shall have the right to appear and to be heard, and (b) by sanction ing the freedom of students to express dissent from the views of the speaker provided, however, that that expression of dissent be orderly and nonobstruc tive.

The University distinguishes between orderly protest and resistance-by-ob struction; it accepts the former as a legitimate expression of dissent while re jecting the latter as an abridgement of the freedoms of the individuals wh may be its object.

The following was approved by the University's Board of Trustees on Octobe 19, 1968:

The George Washington University is opposed to discrimination based o race, color, or creed. Such discrimination may have appeared in campu organizations in the past. In the future, however, no organization can be recog nized or supported by the University unless it provides continued assurance o nondiscrimination in membership practices and in intent, considered adequat by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on Octobe 19, 1968:

The University cannot condone violations of law, including violation o those laws which proscribe possession, use, sale, or distribution of certain drug Members of the academic community should know that administrative action which may include dismissal from the residence halls, revocation of othe privileges, or suspension or dismissal from the University, may be taken i order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the Faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved b the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

(a) who engages in conduct that unreasonably obstructs teaching, research and learning, or

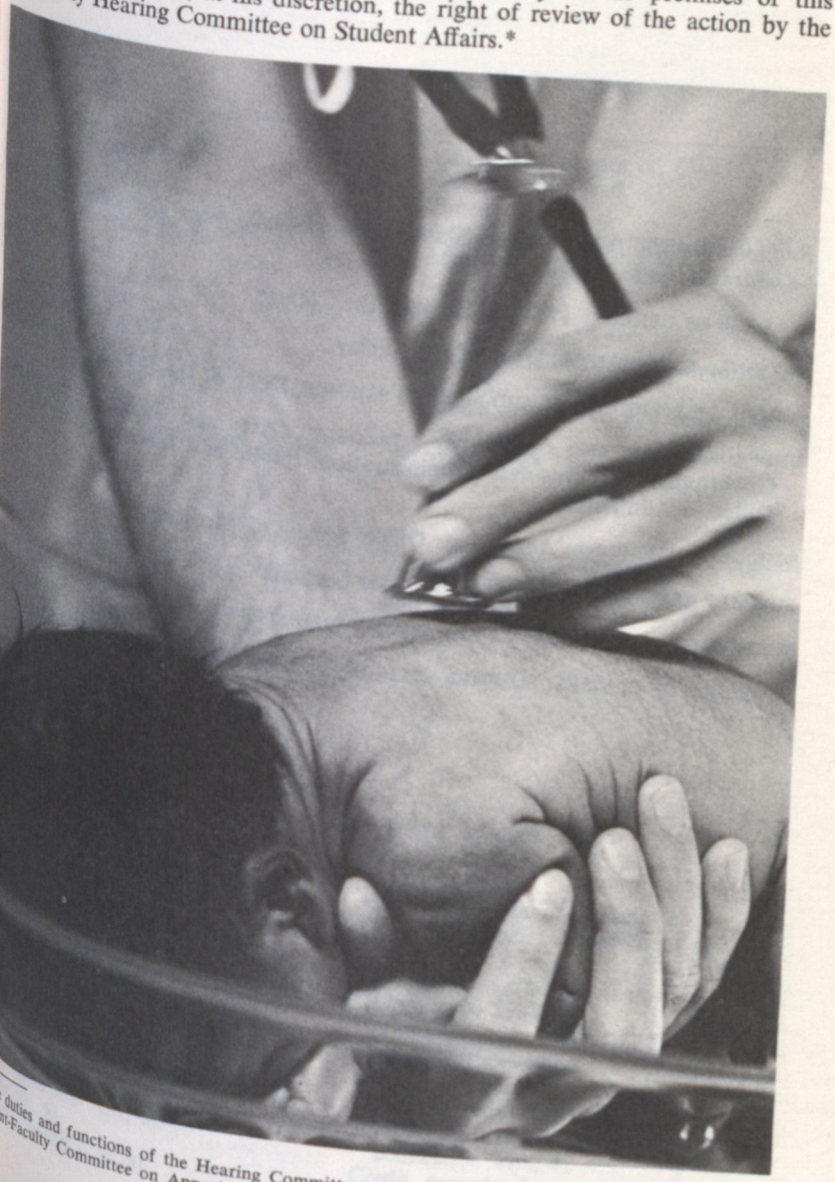
(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

(c) who disobeys general regulations of the University, or

(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established within the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*



* duties and functions of the Hearing Committee on Student Affairs are now performed by the ent-Faculty Committee on Appeals.

ANNUAL ISSUES OF THE UNIVERSITY BULLETIN

Requests for the following publications must include your zip code and sho
be addressed as indicated.

COLLEGE OF GENERAL STUDIES, Dean of the College

NATIONAL LAW CENTER, Dean of the Center

SCHOOL OF ENGINEERING AND APPLIED SCIENCE, Dean of the School

UNDERGRADUATE AND GRADUATE CATALOGUE (Arts and Sciences, Educatio
Government and Business Administration, Public and International Affairs
Office of Admissions

SCHOOL OF MEDICINE, Admissions Office, School of Medicine

SUMMER SESSIONS, Dean of the Summer Sessions

SCHEDULE OF CLASSES: FALL AND SPRING SEMESTERS, Registrar

SCHEDULE OF CLASSES: SUMMER SESSIONS, Dean of the Summer Sessions

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12/72—Cornelius—15M

COLLEGES AND SCHOOLS—DEGREE PROGRAMS

COLUMBIAN COLLEGE OF ARTS AND SCIENCES: Associate in Arts (A.A.), Associate in Arts in General Studies (A.A. in Gen.Std.), Bachelor of Arts (B.A.), Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bachelor of Science in Environmental Health (B.S. in Env.Health), Bachelor of Science in Geodetic and Cartographic Science (B.S. in Geod. and Cart.Sc.), Bachelor of Science in Medical Technology (B.S. in Med.Tech.), and Bachelor of Science in Oceanography (B.S. in Ocea.)

GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master of Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.), Master of Music (Mus.M.), Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers), Master of Science in Forensic Science (M.S. in Forens.S.), Master of Science in Special Studies (M.S. in Sp.Std.), and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE: Associate in Science (A.S.), Bachelor of Science in Allied Health Science (B.S. in A.H.S.), and Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master of Comparative Law (M.Comp.L.), Master of Comparative Law (American Practice) (M.Comp.L.(Am.Prac.)), and Doctor of Juridical Science (S.J.D.)

SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil Engineering) (B.S. (C.E.)), Bachelor of Science (Electrical Engineering) (B.S. (E.E)), Bachelor of Science (Mechanical Engineering) (B.S. (M.E.)), Master of Engineering Administration (M.E.A.), Master of Science (M.S.), and Doctor of Science (D.Sc.)

SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed.) Bachelor of Science in Physical Education (B.S. in P.E.), Master of Arts in Education (M.A. in Ed.), Master of Arts in Teaching (M.A.T.), Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Business Administration (B.B.A.), Bachelor of Science in Administration (B.S. in Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.), Master of Arts in Government (M.A. in Govt.), Master of Arts in Health Care Administration (M.A. in H.C.A.), Master of Public Administration (M.P.A.), Master of Business Administration (M.B.A.), Master of Science in Administration (M.S. in Adm.), Master of Urban and Regional Planning (M. of Urb. and Reg.Plan.), Post-Master's Graduate Certificate in Health Care Administration (Grad.Cert. in H.C.A.), Doctor of Business Administration (D.B.A.), and Doctor of Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.), Master of Arts (M.A.), and Master of Science in International Affairs (M.S. in

THE GEORGE WASHINGTON UNIVERSITY

COLUMBIAN COLLEGE OF ARTS AND SCIENCES, 1821

THE GRADUATE SCHOOL OF ARTS AND SCIENCES, 1893

THE SCHOOL OF MEDICINE, 1825

THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, 1928

THE COLLEGE OF GENERAL STUDIES, 1950

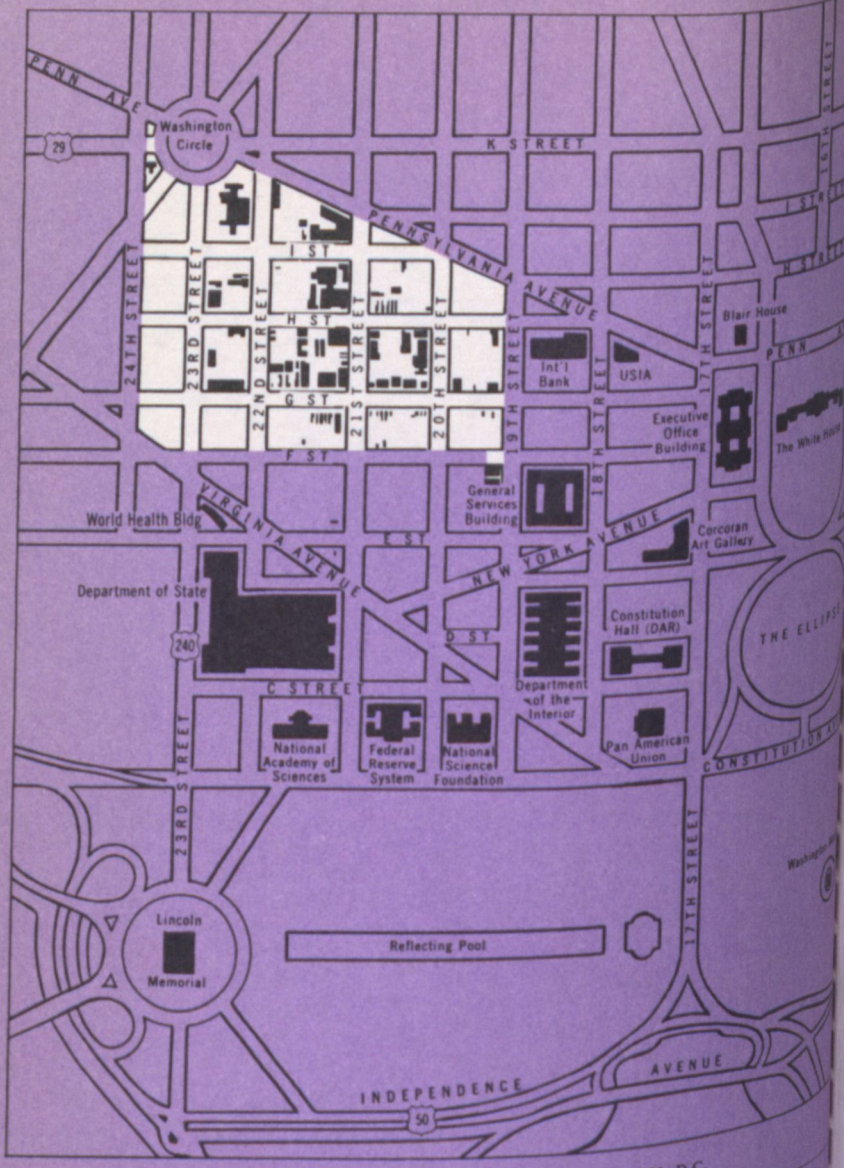
THE DIVISION OF UNIVERSITY STUDENTS, 1930

THE SUMMER SESSIONS, 1916

THE UNIVERSITY HOSPITAL, 1898

THE GEORGE WASHINGTON UNIVERSITY BULLETIN

NATIONAL
LAW
CENTER



THE GEORGE WASHINGTON UNIVERSITY CAMPUS / WASHINGTON, D.C.

THE GEORGE WASHINGTON UNIVERSITY BULLETIN
Volume LXXI, Number 10, July, 1973

Published by The University at Washington, D. C. 20006

MONTHLY: JANUARY, MAY, JUNE, JULY
(2 ISSUES IN DECEMBER, FEBRUARY, APRIL)

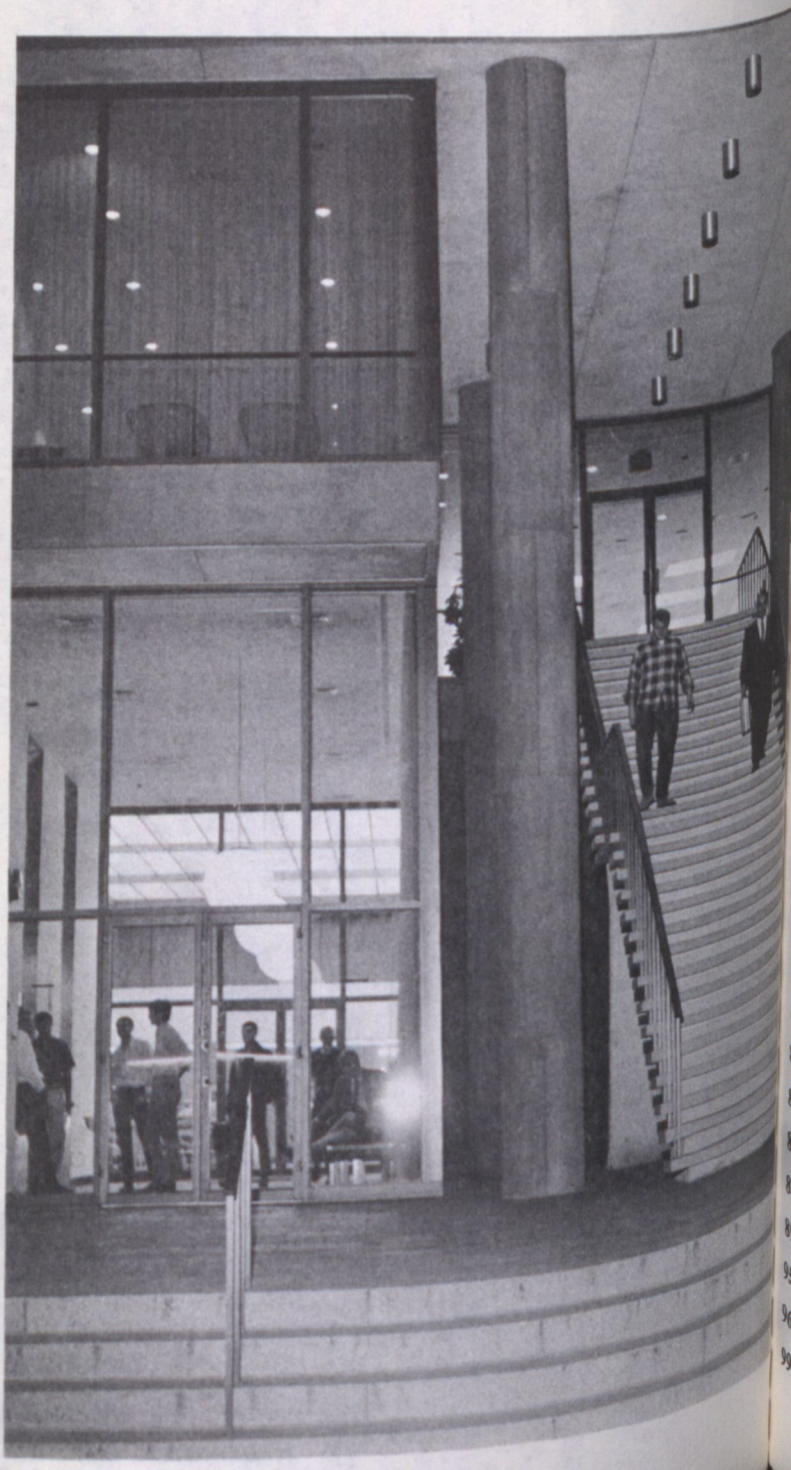
Second Class Postage Paid at Washington, D. C.

THE GEORGE WASHINGTON UNIVERSITY BULLETIN

THE NATIONAL LAW CENTER

1973–1974

WASHINGTON, D.C. 20006



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THE CALENDAR 1973–74*

1973

SEPTEMBER

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1973 SUMMER TERM

May 29 Registration for all sessions (12 am–7 pm) *Tuesday*
Application for September 30 graduation due as a p
of registration

May 30 First-session and 13-week session classes begin *Wedn*
day

July 4 Holiday *Wednesday*

July 6 First-session classes end *Friday*

**July 9–11* First-session examination period *Monday–Wednesday*

July 12 Registration for students attending 2d session only (2
pm) *Thursday*
Application for September 30 graduation due as part o
registration

July 13 Second-session classes begin *Friday*

August 22 Last day of classes *Wednesday*

August 23–25 Second-session and 13-week session examination perio
Thursday–Saturday

* Courses in the 13-week session will meet on their regularly scheduled days during the week
July 9.

* Hours

1973 FALL SEMESTER

August 23–24	Registration *Thursday* (11 am–7 pm)—*Friday* (3–7 pm)
August 27	Classes begin *Monday*
September 3	Labor Day (holiday) *Monday*
October 5	S.J.D. dissertations of February candidates due *Friday*
November 21	Thanksgiving recess begins after last class *Wednesday*
November 26	Classes resume *Monday*
December 5	Last day of fall-semester classes *Wednesday*
December 6–22	Examination period for students other than those students in the first-year J.D. degree program *Thursday–Saturday*
January 2	LL.M. theses of February candidates due *Wednesday*
January 4, 7, 9	Examination period for students in the first-year J.D. degree program *Friday, Monday, Wednesday*

1974 SPRING SEMESTER

**January 14–15*	Registration *Monday–Tuesday*
	Application for May graduation due as part of registration
January 16	Classes begin *Wednesday*
February 1	S.J.D. dissertations of May candidates due *Friday*
February 18	Winter Convocation (holiday) *Monday*
March 12	Application for 1974–75 teaching fellowships due *Monday*
March 30	Spring recess begins after last class *Saturday*
April 8	Classes resume *Monday*
April 29	LL.M. theses of May candidates due *Monday*
May 1	Last day of spring-semester classes *Wednesday*
May 2–18	Examination period *Thursday–Saturday*
May 26	Commencement *Sunday*

of registration to be announced.

THE NATIONAL LAW CENTER

HISTORY

THE LAW CENTER, the oldest law school in the District of Columbia, was established in 1865 with a formal program of two years of study. This was largely through the efforts of the Reverend George Whitefield Samson, President of Columbian College, whose action resulted in the purchase of a separate building for holding law classes. The building had belonged to Trinity Church, of which Francis Scott Key had been Senior Warden. It was occupied by the Law Center until 1884.

Sixty graduates, from twenty-two of the then thirty-seven states, received degrees in 1867. The school continued to have a student body and a faculty which reflected the fact that it was at the seat of our nation's government. Associate Justices David J. Brewer and John Marshall Harlan of the Supreme Court of the United States were among the prominent members of the bench and bar who were on the faculty.

In 1877, one year after the first such program was adopted in the United States, the Law Center instituted a course leading to the degree of Master of Laws. In 1898, the course of instruction for the degree of Bachelor of Laws was extended to three years. The Law Center took part in 1900 in the organization of the Association of American Law Schools.

In the past quarter-century the Law Center expanded its course and seminar offerings with consideration of the needs of first-degree and graduate students. The degree of Doctor of Juridical Science was instituted in 1940. The need of foreign lawyers who came to this country and who required additional preparation for law work in the United States resulted in the creation of programs for the degrees of Master of Comparative Law in 1946 and Master of Comparative Law (American Practice) in 1951.

In 1954, National University School of Law, which had an important place in legal education in the District of Columbia since 1869, was absorbed by the George Washington University Law School.

Since 1954, programs of special research and study have enriched the basic curriculum. These include the Institute of Law, Psychiatry, and Criminology; Environmental Law Program; Patent Law Program; International Law Program; the Government Contracts Program; and the Law, Science, and Technology Program.

Additionally, the Law Center has been a leader in developing a curriculum to meet the legal needs of the poor and the disadvantaged. A clinical law

program has been developed which is the equal of that at any law school in the nation. Special projects include the Community Legal Clinic, the Consumer Protection Center, the George Washington Legal Aid Bureau, the Students-in-Court Program, the Public Defender Project, the U.S. Attorney Assistance Program, and individual projects supervised by the Law Students Civil Rights Research Council.

Realizing the need for legal services for all members of society, the National Law Center, while maintaining its strong course offerings in patent law, administrative law, and corporate law, has developed a rich selection of courses in poverty law covering housing, sales, civil rights, and welfare.

Alumni of the National Law Center have included United States Senators, Congressmen, Ambassadors, and Cabinet Members. Its graduates have gone on to become members of both the federal and state judiciaries as well as noted members of the bar of every state in the union.

LOCATION IN THE NATION'S CAPITAL

Of special significance is the location of the National Law Center in the Nation's Capital, the focal point of the law in action, both American and international. The work of the Center goes on in this environment, presenting a unique opportunity for observation and study of federal agencies—judicial, legislative, and administrative. Readily accessible are the Supreme Court of the United States, the federal trial and appellate courts of the District of Columbia, and, in addition, federal courts of special jurisdiction, such as the United States Court of Claims, the United States Court of Customs and Patent Appeals, the Tax Court of the United States, and the Court of Military Appeals. Current federal legislation can be studied as it is considered by Congressional committees and as it comes up for debate on the floors of the House of Representatives and the Senate. With respect to the federal administrative agencies, students here in Washington have matchless opportunities for study and observation. They can attend informal and formal hearings of these agencies and can obtain from the docket sections complete records of administrative adjudication in specific cases. Illustrative of such federal agencies are the Interstate Commerce Commission and the Civil Aeronautics Board in the field of transportation; the Federal Trade Commission in the field of trade regulation; the Securities and Exchange Commission in the field of security issues and corporate finance; the National Labor Relations Board in the field of labor-management relations; the United States Patent Office in the field of patent law; the Federal Power Commission in the field of water, natural gas, and electric power; and the Federal Communications Commission in the field of radio and television.

Supplementing these environmental advantages of law in action are the exceptional research library collections in the Library of Congress, in the various departments of the federal government, and in the libraries of the headquarters of national and international organizations. The notable library of the Carnegie Foundation for International Peace has been acquired by George Washington University for use of research students in international and comparative law, fields with respect to which Washington has come to be called "The Capital of the World."

The years of residence at law school are years of participation in the life of the community, which in the case of the George Washington University National Law Center is the government of the United States. As a consequence

the study of law takes on added meaning, whether the goal be government service or practice, general or specialized, and whatever the community in which the student plans to practice.

OBJECTIVES

The purpose of the National Law Center is to prepare men and women to meet the needs of society in many fields of law. As a national law school, the Center does not emphasize any particular geographic area in its instruction; therefore, it prepares students to practice law in any part of the country. The Center also offers a program of legal education for foreign students. The Law Center seeks to fulfill these objectives through (1) a rich and varied curriculum taught by eminent professors and highly qualified specialized instructors, including a former Commissioner of the Internal Revenue Service and a former Chairman of the Securities and Exchange Commission; (2) an extensive clinical law program where students learn legal skills by actual practice; (3) two law journals which specialize in public law and international law; (4) actual trial practice; (5) participation in the Van Vleck Appellate Case Club (a moot court competition); (6) a series of student professional co-curricular activities; (7) studies on an advanced level for foreign as well as for American students; and (8) a continuing legal education program for members of the bar.

THE NATIONAL LAW CENTER COMPLEX

The National Law Center Complex consists of three buildings: Stockton Hall, Bacon Hall, and the Jacob Burns Law Library.

STOCKTON HALL

Stockton Hall is the main classroom building. It also holds faculty offices and the offices of the Dean and the Associate Deans of the Law Center, as well as the Records Office and student lounges.

BACON HALL

Bacon Hall houses faculty offices; the *George Washington Law Review* Office; the Institute of Law, Psychiatry, and Criminology; the Government Contracts Program; the Community Legal Clinic; the Admissions Office; the Law Center Placement Office; the offices of the *Journal of International Law and Economics*; the Black America Law Student Association; the Law Students Civil Rights Research Council; the Van Vleck Appellate Case Club; the *Advocate*, the law school newspaper; the Student Bar Association; the Consumer Protection Center; the Legal Aid Bureau; and La Raza, the national Chicano law students association.

THE JACOB BURNS LAW LIBRARY

The Law Library of substantially over 130,000 volumes is housed in the modern Jacob Burns Law Library Building, adjoining Stockton Hall on the south side. This facility, opened for use on October 1, 1967, comprises nine floor

and deck levels with about 49,000 square feet of floor space. Its shelf capacity now in place will accommodate over 170,000 volumes; with supplementary shelving in Stockton Hall and a small branch for the *Law Review* in Bacon Hall, the library provides space for almost 200,000 volumes. Seating for more than 450 readers is provided in four reading rooms, lounge and smoking areas, carrels, enclosed study cubicles, semi-private reading alcoves, and seminar rooms. Three photocopy machines are provided for reader use.

The collections comprise a comprehensive working library of Anglo-American law, with supplementary material in disciplines peripheral to law (such as business, finance, labor relations, sociology, criminology, political science, biography, foreign affairs, and others). Special areas are maintained for collections in tax law, labor law, patent-trademark-copyright law, international law, and foreign and comparative law. Included in the collections are the appellate decisions of all state courts and decisions of the federal courts, with comprehensive collections of English and Canadian court decisions; the currently annotated statutes of the 50 states; all federal statutes; English and Canadian statutes; selected statutes of other nations; and an extensive periodical collection, kept current by more than 950 subscriptions, covering virtually all American legal periodicals and most of those published in English throughout the world. The library is strong in its treatise holdings, administrative and regulatory materials, and Congressional coverage. The growing international law holdings include virtually complete collections of United Nations printed material and that of the European Economic Community, all recent material from the International Labor Organization, and current and retrospective collections of international treaties. A large portion of the holdings of the former library of the Carnegie Endowment for International Peace, acquired by the University in 1950, are in the Law Library.

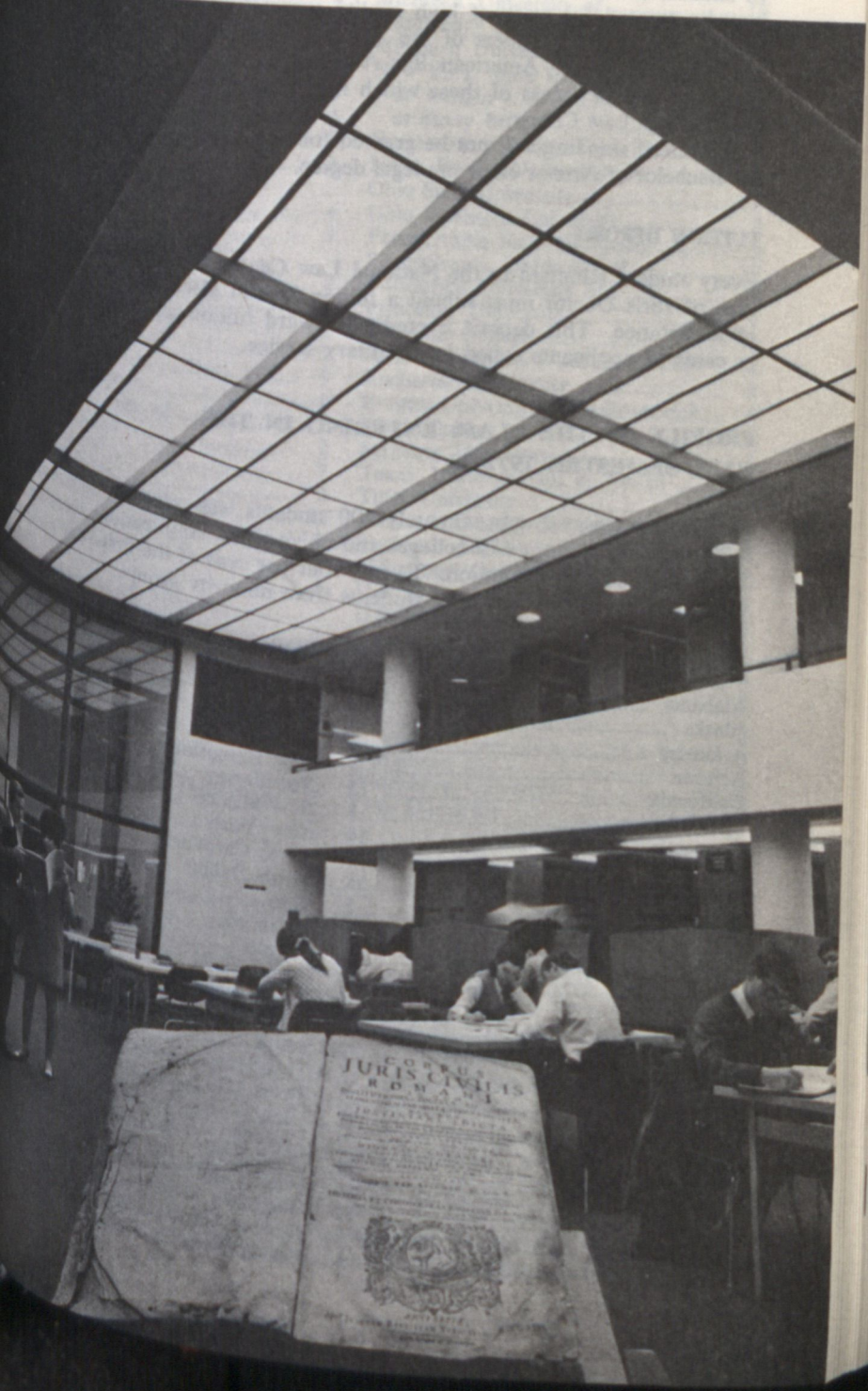
The Juris Doctor Degree Program

ENTRANCE REQUIREMENTS

For information on "Application for Admission" to the Juris Doctor degree program, see page 28. Admission to candidacy for the degree of Juris Doctor requires a Bachelor of Arts or equivalent degree from an accredited college or university, a satisfactory quality of work, and an acceptable distribution of courses. Any substantial number of hours taken on a pass-fail or other type of graded basis may be seriously detrimental to an applicant's chances for admission. Eligibility is based on personal and scholastic records and on the result of the Law School Admission Test. No applicant will be acceptable as a transfer who is ineligible to return in good standing to a previously attended law school. From the applicants, a selection is made by the Committee on Admissions.

Information concerning the Law School Admission Test may be obtained from the Dean of the National Law Center or from the Educational Testing Service, 20 Nassau Street, Princeton, N.J. 08540; or 1947 Center Street, Berkeley, Calif. 94704. The test is administered at various centers in the United States. It is anticipated that the testing dates for 1973–74 will be in October, December, February, April, and July. Completed application blanks and fees

must be received by the Educational Testing Service at least two weeks before the date of the test. It is not necessary that formal application for admission be made prior to taking the test.



ADVANCED STANDING

In unusual circumstances, advanced standing toward the degree of Juris Do may be granted for work of high quality successfully completed in other schools which are members of the Association of American Law Schools are approved by the American Bar Association. Transferred credits will be recognized in excess of those which might be earned in a similar period the National Law Center.

Advanced standing will not be granted for law work already counted tow the Bachelor of Arts or other pre-legal degree.

TUITION DEPOSIT

Every student admitted to the National Law Center as a candidate for the gree of Juris Doctor must submit a tuition deposit after receipt of notificati of acceptance. This deposit is credited toward tuition and is refundable o in cases of applicants called into military service.

PROFILE OF THE CLASS ENTERING IN THE FALL SEMESTER 1972–73

A first-year class of approximately 400 students was selected from more th 5,000 applicants from 650 colleges and universities. Applications were receiv from every state in the union. Twenty-four per cent of the first-year class w women; thirteen per cent were students from minority groups.

GEOGRAPHICAL DISTRIBUTION OF STUDENTS

Alabama	1	Missouri	
Alaska	2	Nebraska	
Arkansas	2	Nevada	
Arizona	3	New Hampshire	
California	13	New Jersey	
Colorado	3	New Mexico	
Connecticut	14	New York	
Delaware	1	North Carolina	
District of Columbia	55	North Dakota	
Florida	5	Ohio	
Georgia	4	Oklahoma	
Hawaii	1	Oregon	
Idaho	1	Pennsylvania	
Illinois	14	Rhode Island	
Indiana	5	South Carolina	
Iowa	2	South Dakota	
Kansas	3	Tennessee	
Kentucky	1	Texas	
Louisiana	2	Utah	
Maine	2	Virginia	
Maryland	34	Washington	
Massachusetts	20	West Virginia	
Michigan	13	Wisconsin	
Minnesota	2	Austria	
Mississippi	1	Puerto Rico	

INSTITUTIONS IN WHICH STUDENTS EARNED DEGREES

American University	6
Amherst College	4
Arizona, University of	2
Barnard College	2
Boston College	2
Boston University	3
Brigham Young University	6
Brown University	5
Bucknell University	3
California, University of:	
Berkeley	4
Los Angeles	3
City University of New York:	
City College	2
Hunter College	2
Claremont Men's College	5
Colorado, University of	2
Cornell University	9
Dartmouth College	6
Delaware, University of	2
Dickinson College	2
Duke University	7
Emory University	2
George Washington University	32
Georgetown University	3
Harvard University	6
Howard University	4
Illinois, University of, Urbana-Champaign	3
Indiana University at Bloomington	3
Johns Hopkins University	2
Lincoln University, Pa.	5
Manhattanville College of the Sacred Heart	3
Maryland, University of	11
Massachusetts Institute of Technology	3
Miami University	2
Michigan State University	5
Michigan, University of	13
Middlebury College	3
Missouri, University of, Columbia	2
New York, State University of:	
at Buffalo	5
at Stony Brook	8
Northwestern University	4
Notre Dame, University of	6
Ohio State University	3
Ohio Wesleyan University	2
Pennsylvania State University	6
Pennsylvania, University of	17
Pittsburgh, University of	7
Princeton University	3
Radcliffe College	2
Randolph-Macon Woman's College	2
Rochester, University of	5
Rutgers University, New Brunswick	4
Smith College	3
Syracuse University	4
Texas, University of, at Austin	3
Tufts University	3
Tulane University of Louisiana	3
Tuskegee Institute	2
U.S. Coast Guard Academy	2
U.S. Military Academy	4
U.S. Naval Academy	3
Virginia, University of	3
Washington University	2
Williams College	4
Wisconsin, University of:	
LaCrosse	2
Madison	5
Wittenberg University	2
Yale University	4

The following colleges and universities are each represented by one member of the first-year class: Albion College; Auburn University; Beaver College; Bowdoin College; Bradley University; Brandeis University; California State University, Hayward; California State University, San Diego; California State University, San Francisco; Carnegie-Mellon University; Carson-Newman College; Catholic University of America; Centre College of Kentucky; City University of New York, Queens College; Clark University; Colgate University; College of New Rochelle; College of the Holy Cross; College of William and Mary; Columbia University; Delaware State College; Denison University; DePauw University; District of Columbia Teachers College; Dominican College of San Rafael; Drew University; Drexel University; Fairleigh Dickinson University; Federal City College; Florida State University; Gonzaga University; Goucher College; Hamilton College; Hastings College; Hollins College; Illinois State University; Iowa State University of Science and Technology; Jackson State College; Kansas State University; Lakeland College; Lehigh University; Lin-

denwood College; Macalester College; Marquette University; Maryland Bapt
College; McGill University, Canada; Millsaps College; Morgan State Colleg
Mount Holyoke College, Muhlenberg College; New York Institute of Tech
nology; New York University; Newton College of the Sacred Heart; Nort
Carolina Agricultural and Technical State University; North Carolina Sta
University of Raleigh; Ohio University; Ouachita Baptist University; Our La
of the Lake College; Pan American University; Polytechnic Institute of Brook
lyn; Prairie View Agricultural and Mechanical College; Purdue Universit
Randolph-Macon College; Rensselaer Polytechnic Institute; Rice Universit
St. Anselms College; St. John's College, Kansas; Saint Mary's College, Ind
Saint Mary's College, Minn.; Savanah State College; Simpson College, Iowa
Southern Methodist University; Stanford University; State University of Ne
York at Albany; Suffolk University; Texas Technological University; Transy
vania University; Tri-State College; Trinity College, Conn.; Union College an
University; U.S. Air Force Academy; U.S. Naval Postgraduate School; Univer
sity of California, San Diego; University of California, Riverside; Universi
of Connecticut; University of Dayton; University of Florida; University
Iowa; University of Kansas; University of Massachusetts, Amherst; Universi
of Massachusetts, Boston; University of Minnesota, Minneapolis-St. Paul; Un
versity of Nebraska, Lincoln; University of New Hampshire; University
North Carolina at Charlotte; University of Northern Colorado; University
Oklahoma; University of Oregon; University of Scranton; University of Sou
Carolina; University of Tampa; University of Toledo; University of Utah
University of Washington; Utah State University; Vanderbilt University; Vi
sar College; Virginia Polytechnic Institute and State University; Wayland
Baptist College; Weber State College; Wesleyan University; West Virginia

Wesleyan College; Westminster College, Pa.; Wheaton College, Ill.; Wichita State University; Worcester Polytechnic Institute; Yeshiva University.

THE CURRICULUM

The curriculum for the degree of Juris Doctor at the National Law Center offers the candidate one of the largest and most varied selections of courses in the country. The first-year student is required to take courses in Civil Procedure, Constitutional Law, Contracts, Criminal Law and Procedure, Legal Research and Writing, Property, and Torts. These courses give the student the basis upon which all further legal study is built. In the second and third years of study, the student must take Evidence and fulfill a two-credit legal writing requirement. Beyond these requirements the student is free to choose from the many course and project offerings. The Law Center prides itself on allowing the student freedom to design his own program of study.

The curriculum is organized so that students may begin the study of law for the Juris Doctor degree only at the start of the fall semester. Transfer students may enter at the start of the spring semester also.

DAY DIVISION

First Year

FALL SEMESTER		SPRING SEMESTER	
Contracts I	4	Contracts II	2
Torts	4	Property	4
Criminal Law and Procedure	4	Constitutional Law	4
Legal Research and Writing	2	Civil Procedure	4
Total semester hours	14	Total semester hours	14

Second Year

FALL SEMESTER		SPRING SEMESTER	
Elective	14	Evidence	4
		Elective	10
Total semester hours	14	Total semester hours	14

Third Year

FALL SEMESTER		SPRING SEMESTER	
Elective			
Legal writing requirement	12	Elective	14
Total semester hours	2		
	14	Total semester hours	14

This requirement may be satisfied by service on the *Law Review*, by satisfactory completion of a seminar which requires a research paper, or by satisfactory completion of Law 344, *Legal Writing*.

EVENING DIVISION

First Year

FALL SEMESTER		SPRING SEMESTER	
Contracts I	4	Contracts II	
Torts	4	Criminal Law and Procedure	
Legal Research and Writing	2	Civil Procedure	
Total semester hours	10	Total semester hours	

Second Year

FALL SEMESTER		SPRING SEMESTER	
Property	4	Constitutional Law	
Elective	6	Elective	
Total semester hours	10	Total semester hours	

Third Year

FALL SEMESTER		SPRING SEMESTER	
Elective	8	Evidence	
*Legal writing requirement	2	Elective	
Total semester hours	10	Total semester hours	

Fourth Year

FALL SEMESTER		SPRING SEMESTER	
Elective	10	Elective	
Total semester hours	10	Total semester hours	

Summer Term or Ninth Semester

Elective	4

REQUIREMENTS FOR THE DEGREE

The student must have completed a residence period of three academic years (four years for evening students) and 84 semester hours of required and elective courses, with a cumulative average of at least 65. At least one academic year of residence and 28 semester hours are required of students admitted with

* This requirement may be satisfied by service on the *Law Review*, by satisfactory completion of a seminar which requires a research paper, or by satisfactory completion of Law 344, *Legal Writing*

advanced standing. The work of the final semester or summer session must be completed while in residence at the National Law Center. Credits allowed by way of advanced standing are not included in computing the average required for graduation.

Graduation Requirements.—See page 42 for a statement of the graduation requirements.

RESIDENCE

Candidates for the Juris Doctor degree must complete a residence period of three academic years. Attendance in the day division for the fall and spring semesters constitutes residence for an academic year; similar attendance in the evening division constitutes residence for three-fourths of an academic year. Consequently, a day student must attend 6 semesters to meet residence requirements; an evening student must attend 8. Students authorized to take schedules of less than 10 hours in the day division or less than 6 hours in the evening division receive residence credit on a proportional basis. Students who attend the summer sessions receive fractional residence credit.

HONORS

The degree of Juris Doctor "With Honors" is awarded students who obtain a minimum cumulative average of 75 but less than 85; the degree of Juris Doctor "With Highest Honors" is awarded students who obtain a minimum cumulative average of 85.

ORDER OF THE COIF

The Order of the Coif, a national legal honor society, aims "to foster a spirit of careful study and to mark in a fitting manner those who have attained a high grade of scholarship." The George Washington University Chapter was established in 1926. Members are elected each year from the highest-ranking 10 per cent of the graduating Juris Doctor candidates.

PUBLICATIONS

The *George Washington Law Review*, published five times a year, is edited and managed by the students of the National Law Center. The *Law Review* is known for its emphasis on federal and public law; however, it is also devoted to research in other important legal areas. The staff of the *Law Review* is selected on the basis of a writing competition and on the basis of grades. The editorial board is selected from those students who have successfully completed the first year of *Review* work. Students receive 4 semester hours of academic credit for the two-year program.

The *Journal of International Law and Economics*, managed and edited by law students, is a biannual publication of the Law Center. It presents articles and commentaries on public and private international financial development, cooperative law, and international law. The staff of the *Journal* is selected through a writing competition, and students earn academic credit for their work.

MOOT COURT

The Van Vleck Appellate Case Club provides realistic training in appellate ora
advocacy for students in the National Law Center. Each year two competi
tions are held: the upperclass competition is held in the fall and the first-year
competition is held in the spring.

LAW CENTER ORGANIZATIONS

BLACK AMERICA LAW STUDENT ASSOCIATION (BALSA)

The Black America Law Student Association is a national Black law student
organization which has chapters at some 80 law schools. BALSA sponsors law
speakers and various programs.

ENVIRONMENTAL LAW SOCIETY (ELS)

As part of the National Law Center's extensive Environmental Law Program,
the Environmental Law Society is a group of students keenly interested in the
quality of the environment and its relationship to law. ELS offers a short
course on environmental law and is active in research and writing in this area.

INTERNATIONAL LAW SOCIETY

The International Law Society is an organization of students interested in the
practice of international law. The Society sponsors speakers and various pro
grams.

LA RAZA

A national Chicano law students organization which has chapters at various law
schools, La Raza sponsors law speakers and various programs.

LAW FRATERNITIES AND SORORITIES

The chapters of Beta Kappa Pi, Delta Theta Phi, Phi Alpha Delta, and Phi
Delta Phi at the National Law Center sponsor speakers and various social
occasions.

LAW STUDENTS CIVIL RIGHTS RESEARCH COUNCIL (LSCRRC)

The Law Students Civil Rights Research Council is a national organization of law students concerned with the legal problems of civil rights. LSCRRC offers clinical law projects for which students may receive academic credit.

PATENT LAW CLUB

The Patent Law Club, an organization of students interested in patent and related law, conducts an extensive speakers program as well as various social events.

STUDENT BAR ASSOCIATION

The Student Bar Association is the law student governing body, responsible for allocating funds among the various student organizations. It also conducts a speaker program for the law school. All members of the student body are members of the Student Bar Association.

TAX LAW ASSOCIATION

As an organization of students interested in careers in tax law, the Tax Law Association conducts various programs of interest to tax law specialists.

WOMEN'S RIGHTS COMMITTEE (WRC)

The Women's Rights Committee is an organization of all the women in the law school. It is primarily interested in the place of women in law schools and in the legal profession. WRC conducts seminars and sponsors speakers.

JOINT JURIS DOCTOR—MASTER'S DEGREE PROGRAM

In certain instances, arrangements may be made for students to work concurrently toward both the Juris Doctor degree in the National Law Center and a Master's degree in some fields in the University's Graduate School of Arts and Sciences, School of Government and Business Administration, or School of Public and International Affairs. Fields in which this program is available include Business Administration, Economics, International Affairs, Political Science, Public Administration, and Public Affairs. Students must be admitted both to the National Law Center and, separately, to the School which will confer the Master's degree, and must meet all requirements in each degree program. It is possible for a student to complete work for both degree programs within four years.

Master's and Doctoral Programs

THE ADMINISTRATION OF JUSTICE under law is a matter so vast and complex that some who hold the Bachelor of Laws or Juris Doctor degree feel the need for further study. The Master's and doctoral programs give students the opportunity to broaden and deepen their understanding of the law.

The Master of Laws candidate may follow a program of general study
concentrate in one of the specialized areas listed below. Courses in each
these areas are included in the 401–600 series. Graduates who complete the
work in one of these areas may have the field of specialization noted on the
diplomas.

Administrative Law: Economic Regulation
Comparative Law
Corporation Law
Environmental Law
Government Procurement Law
International Law
Labor Law
Law and Poverty
Law, Psychiatry, and Criminology
Law, Science, and Technology
Natural Resources Law
Patent and Trade Regulation Law
Taxation
Urban Legal Studies

Programs leading to the degree of Doctor of Juridical Science offer the a
vanced student the opportunity to concentrate on research and writing in a spe
cific area of interest to the legal profession.

MASTER OF LAWS

ENTRANCE REQUIREMENTS

A Bachelor's degree from an accredited college or university and a Bachelo
of Laws, Juris Doctor, or equivalent degree from a law school which is a mem
ber of the Association of American Law Schools or is approved by the Amer
ican Bar Association are required. The applicant must have demonstrated a
high degree of academic excellence. Advanced standing is not granted fo
credits earned while a candidate for the first degree in law.

DEGREE REQUIREMENTS

The student must complete a residence period of not less than two semesters, which should be continuous. All requirements for the degree must be completed in this Law Center and in a period not exceeding three years from the time of registration for the degree. The student must complete 24 semester hours of courses and writing projects with grades of 65 or above. A minimum average of 75 is required. The student is expected to include Law 599–600 *Thesis* in the 24–semester–hour requirement for the degree (for exception, see "Master's Thesis," below).

Candidates for the degree in a selected field of specialization must complete a minimum of 12 of the required 24 semester hours in courses and writing projects related to the selected field. Each Master of Laws program of study may include a limited number of courses numbered in the 300 series, with the approval of the Dean.

MASTER'S THESIS

Each candidate for the degree of Master of Laws is expected to write a Master's thesis (Law 599–600) under the supervision of a member of the faculty of the National Law Center. Four hours of credit will be granted for successful completion of the thesis. The purpose of this requirement is to demonstrate the ability of the student to perform research in a special area of the law and to produce a scholarly paper containing the results of this research. The thesis is expected to be of substantially the same quality as a Law Review article. The Dean may waive the thesis requirement if the student has demonstrated his research and writing ability by taking a minimum of 6 semester hours of course work designated "Research Paper."

The thesis in its final form must be presented to the Adviser no later than the date specified in the Calendar. Two complete copies are required. It is the responsibility of the candidate to obtain from the Office of the Post-J.D. degree programs a printed copy of the regulations governing the styling and reproduction of theses. The mandatory thesis binding fee of $10 must be paid at the time of registration for the last semester's work.

Accepted theses become the property of the University and are deposited in the Law Library, where the duplicate copies are bound and made available for circulation.

HONORS

The degree of Master of Laws "With Highest Honors" is awarded students who attain a minimum cumulative average of 85.

GRADUATE COURSES IN OTHER DEPARTMENTS

A Master of Laws candidate may be permitted to take graduate courses related to his field of interest in other departments of this University. A maximum of nine semester hours will be credited toward the degree for such courses; however, credit will be granted only if the courses are given on campus. Courses numbered 101–200 may be taken for graduate credit only if the student receives approval of the instructor at the time of registration and does additional work, as prescribed by the department offering the course.

CONSORTIUM OF UNIVERSITIES OF THE WASHINGTON METROPOLITAN AREA, INC.

A candidate for the Master of Laws degree may take graduate courses
Georgetown University Law Center through the Consortium of Universities
the Washington Metropolitan Area, Inc. A maximum of 6 semester hours
such courses will be credited toward the degree. Permission to take Consor
tium courses must be granted by the Dean, the Registrar, and the instructo
offering the course.

DOCTOR OF JURIDICAL SCIENCE

ENTRANCE REQUIREMENTS

Admission to candidacy for the degree of Doctor of Juridical Science requires
a Bachelor of Arts or equivalent degree from an approved college or univer
sity; a Bachelor of Laws, Juris Doctor, or equivalent degree, earned with high
rank, from a law school which is a member of the Association of American
Law Schools or is approved by the American Bar Association; in most in
stances a Master of Laws degree with high academic standing; outstanding
capacity for scholarly work in the field of law; and faculty approval of the
applicant's dissertation topic. The applicant must also demonstrate his writing
ability by submitting his Master's thesis or a copy of one or more papers or
articles which he has written. He must submit an outline of his proposed dis
sertation topic in some detail, indicating by chapter and division within chapter
the exact scope of the project. There should be a bibliography for each chapter
listing books, reports, cases, and Law Review articles to be considered. Al
though the outline cannot predict every detail of the subsequent research, it
must be sufficiently definite to afford the faculty a basis for evaluation.

DEGREE REQUIREMENTS

The candidate must complete (1) a residence period of not less than one ac
demic year; (2) a course of study and research—designated by his consultative
committee and approved by the faculty—of no less than 8 semester hours
including *Jurisprudence,* unless previously taken, and two seminars in which
research papers are required; and (3) an acceptable dissertation. The dissertation
tion must be submitted no later than three years from the date of approval of
the dissertation subject. The applicant who proposes to write on a comparative
law topic must have a reading knowledge of the language in which the relevant
materials are to be found. At the conclusion of his first year of residence, or
at such other time as the faculty may set, the candidate must pass an oral exam
ination in those fields of study selected by the consultative committee. This
examination is conducted by the consultative committee and such other mem
bers of the faculty and qualified experts as are selected by the faculty.

No later than the date specified in the Calendar, the candidate must submit
to the Dean two complete copies of the dissertation and two copies of an ab
stract (not to exceed 600 words) of his dissertation. One copy of the abstract
is sent to University Microfilms, Inc., for inclusion in their monthly publica
tion, *Dissertation Abstracts,* which is distributed nationally.

Printed copies of detailed regulations regarding the form and reproduction of
the dissertation, preparation of the abstract, and services offered by University

Microfilms, Inc., are available in the Office of the Dean. The successful candidate for the doctorate is required, before receiving his degree, to pay a fee for the service rendered by University Microfilms, Inc. To be acceptable the dissertation must, in the opinion of the examining committee, constitute a substantial contribution to the field of law concerned and be suitable for publication. Additional information will be supplied by the Dean. Accepted dissertations become the property of the University and are deposited in the Law Library, where the duplicate copies are bound and made available for circulation.

Degree Programs for Foreign Students

THE NATIONAL LAW CENTER has several programs of study available to students trained in law outside the United States. These programs fall into two general categories: (1) those directed toward preparing the student for a bar examination in an American jurisdiction and (2) those that enable the student to return to his country with a more thorough understanding of some aspect of American law.

A student with a degree from a foreign law school is normally admitted to the Center as a Provisional Student, so that the faculty can evaluate his work before admitting him to degree candidacy. Appropriate credit will be granted for work taken as a Provisional Student.

In order to qualify for admission to the bar of an American jurisdiction, the student may apply for either the Juris Doctor (J.D.) or the Master of Comparative Law (American Practice) (M.Comp.L. (Am.Prac.)) degrees. The J.D. degree requires 84 semester hours of work in law school (credit is given for work in a foreign law school only in exceptional circumstances) and will qualify the student to take most U.S. bar examinations. The M.Comp.L. (Am.Prac.) degree requires 28 semester hours of work and satisfies the requirements of the District of Columbia Bar. *The student is cautioned to ascertain the requirements of the bar for which he intends to qualify prior to selection of his law school program.*

A student planning to return to his country may undertake a program leading to the degree of Master of Comparative Law (M.Comp.L.); or, if he has outstanding qualifications, he may undertake advanced work leading to the Master of Laws (LL.M.) or Doctor of Juridical Science (S.J.D.) degree. The M.Comp.L. degree programs enable the student to gain a broader comprehension of the American legal system by taking basic courses in the Law Center. The LL.M. and S.J.D. programs allow the student to work in advanced or specialized legal fields.

ADMISSION PROCEDURE

For general Admission information concerning all National Law Center students see pages 28–29.

Application must be received from *foreign applicants* no later than June 1 for the fall semester (April 1 for candidates for the Juris Doctor degree) and November 1 for the spring semester.

REQUIRED RECORDS

Applicants must request all educational institutions attended to send directly to the Dean official credentials listing subjects studied, grades received, examinations taken, and degrees received. Certified copies of diplomas and certificates from secondary schools and all colleges and universities attended are required. Records of state examinations and certificates are also needed. All records become the property of the University and *cannot* be returned.

LANGUAGE TEST

Students whose native tongue is not English are required to take the *Test of English as a Foreign Language* and attain a minimum score of 550 for admission to the National Law Center. This is a mandatory requirement. Students are responsible for making arrangements for taking the test and should address inquiries to TOEFL, Educational Testing Service, Princeton, New Jersey 08540, U.S.A. The completed application form should be returned to the Testing Service at Princeton well in advance of the beginning of the semester for which the applicant seeks admission. The test fee, which should be remitted with the application, entitles the student to have his test score sent to three different institutions. Registration for the *Test of English as a Foreign Language* does *not* constitute application for admission to George Washington University.

The Bulletin of Information, obtainable without charge, contains a description of the test as well as rules regarding application, fees, reports, and the conduct of the test; lists of examination centers; examination dates; and an application blank. On the application for the test, the student should specify that the scores be sent to the Dean's Office.

ENTRANCE REQUIREMENTS

For the Degree of Juris Doctor.—Entrance requirements for foreign students are the same as those stated on page 28, except that advanced standing is rarely granted for study in foreign law schools.

For the Degrees of Master of Comparative Law and *Master of Comparative Law (American Practice).*—The entrance requirements are the successful completion of and graduation from a course in arts, philosophy, letters, or sciences, equivalent to graduation from a gymnasium, lycee, or liceo; and graduation in law from a recognized foreign university.

For the Degree of Master of Laws.—The entrance requirements are the successful completion of and graduation from a course in arts, philosophy, letters, or sciences, equivalent to graduation from a gymnasium, lycee, or liceo; and graduation in law from a recognized foreign university. The applicant must demonstrate (by good academic record or equivalent performance measure, high class standing, positions held, or professional achievements) that he is capable of Master's level work and must demonstrate a sufficient background in the Common Law to undertake the Master's program.

For the Degree of Doctor of Juridical Science.—The entrance requirements are the successful completion of and graduation from a course in arts, philosophy, letters, or sciences, equivalent to graduation from a gymnasium, lycee, or liceo; graduation in law from a recognized foreign university; outstanding capacity for scholarly work in the field of law; and faculty approval of the applicant's dissertation topic. The applicant must also demonstrate his writing

ability by submitting a copy of one or more papers or articles which he has written. He must submit an outline of his proposed dissertation topic in some detail, indicating by chapter and division within chapter the exact scope of the project. There should be a bibliography for each chapter listing books, reports, cases, and articles to be considered. Although the outline cannot predict every detail of the subsequent research, it must be sufficiently definite to afford the faculty a basis for evaluation.

DEGREE REQUIREMENTS

Juris Doctor, Master of Laws, and *Doctor of Juridical Science.*—Degree requirements for foreign students are the same as those stated on pages 15–17, 21, and 22–23.

Master of Comparative Law.—The student must complete a residence period of not less than two semesters, which should be continuous. All requirements for the degree must be completed in a period not exceeding three years from the time of registration for the degree. The student must complete satisfactorily 24 semester hours of approved courses of the Center, or of such other departments of the University as the faculty of the Center shall approve.

Master of Comparative Law (American Practice).—The requirements for this degree are the same as those for the degree of Master of Comparative Law except that the degree of Master of Comparative Law (American Practice) requires 28 semester hours of course work with a cumulative average of at least 65.

Unclassified Students

TWO TYPES OF STUDENTS may be admitted to the National Law Center as Unclassified Students, in accordance with the following regulations:

1. A candidate for a Bachelor of Laws or Juris Doctor degree with an above-average record at another law school which is a member of the Association of American Law Schools or is approved by the American Bar Association, may at the discretion of the Dean, be admitted as an Unclassified Student to earn credits for transfer to the other law schools.

2. Graduates of law schools which are members of the Association of American Law Schools or are approved by the American Bar Association who wish to take advanced courses without pursuing degree programs may be admitted as Unclassified Students. Applicants with inferior records will not be admitted. Unclassified Students participate in the work of the course, take examinations, and have their grades recorded.

Continuing Legal Education

MEMBERS OF THE BAR wishing to keep abreast of current developments in the law may register for any of the courses in the National Law Center on a non-credit basis as Continuing Legal Education students. Such students do not take examinations in courses and no grades are recorded for their work.

A simplified admission and registration procedure is used and must be completed on or before the last day of regular registration for the appropriate semester. Continuing Legal Education students pay only the tuition fee on the semester-hour basis. They may not participate in student activities or benefit from the medical privileges of the University. (Continuing Legal Education registrations are subject to cancellation if courses are filled by regularly registered students.)

GENERAL INFORMATION

HE NATIONAL LAW CENTER has an enrollment of seventeen hundred students or the J.D. and Post-J.D. degree programs. Approximately one thousand stu- ents are enrolled in the full-time day division for the J.D. degree and four undred are enrolled in the part-time evening division. Three hundred students, any from abroad, are enrolled in the Post-J.D. degree programs.

AY AND EVENING CLASSES

ay classes meet in the mornings in fifty-minute periods and in the afternoons fifty-minute periods and also in sessions of two fifty-minute periods, Monday rough Friday. Trial Practice Court and certain other courses meet for two- our periods on Saturday mornings.

Evening classes meet from 5:50 to 7:40 p.m., Monday through Friday. A ur-credit course, e.g., Evidence, meets two evenings a week; a three-credit urse, e.g., Administrative Law, meets two evenings a week for one-half the mester and one evening for the other half; a two-credit course, e.g., Contracts , meets one evening a week. The evening division conforms to the standards the day division, the full-time faculty participating in the instruction.

Examinations for both day and evening classes may be given in the after- on only. Examinations for day students may be given in the evening only.

MMER TERM

term of two sessions, with day and evening classes, is offered in the summer. ntinuing students and transfer students may register for either or both ses- ns. *No beginning students are admitted to the Juris Doctor program in the mmer term.*

The summer term is shorter than a semester of the academic year, and, as a nsequence, a student must attend two and one-half summer terms to receive sidence credit for one academic year or attend one and one-half summer ms to receive residence credit for a semester.

A maximum of 6 semester hours may be taken each session by day students. y students receive four-tenths of a semester of residence credit for each ses- n of the summer term in which they are registered for 3 or more semester urs. A maximum of 4 semester hours may be taken each session by evening dents. Evening students receive three-tenths of a semester of residence credit each session of the summer term in which they are registered for 2 or more mester hours.

Summer students planning to take the New York bar examination must register at the beginning of the term for both sessions and must complete both and carry a program of at least ten classroom periods a week for day students and at least eight classroom periods a week for evening students.

Admission

APPLICANTS ARE URGED to submit application forms and complete credentials well in advance of the semester for which they seek admission. In the selection process, there is no discrimination because of sex, race, color, or national origin. Two recent signed photographs and an application fee of $25 for a degree candidate, $5 for an Unclassified Student, must accompany the application.

Forms for application for admission or readmission are available at and should be returned to the Office of the Dean of the National Law Center, George Washington University, Washington, D.C. 20006.

For further details concerning students from foreign institutions, see pages 23–25.

APPLICATION FOR ADMISSION

Juris Doctor Program.—Beginning students are admitted only at the start of the fall semester.

The applicant should register with the Law School Data Assembly Service (LSDAS) by completing and mailing the registration form supplied with each application blank. A transcript from each college or university attended should then be sent directly to LSDAS, Educational Testing Service, Box 944, Princeton, New Jersey 08540. No transcript should be sent to the National Law Center. The LSDAS will analyze the transcript and send a copy to this law school and others designated on the registration form. If the transcript which has been forwarded to LSDAS does not show evidence of receipt of a Bachelor's degree, the applicant will be asked, upon acceptance, to submit a final transcript directly to the National Law Center.

To provide time for the evaluation of credentials of beginning students, all papers, including the Law School Admission Test score, should be received by the National Law Center before March 1. This means that the October or December Law School Admission Test should be taken (see "Entrance Requirements," pages 10–12).

All papers of transfer students should be received by the Office of the Dean no later than May 1 for the fall semester, December 1 for the spring semester, and one month prior to registration for the summer session for which application is made.

For additional information, see the official *Pre-Law Handbook*, 1973–74 edition, available in October, 1973, and prepared by the Law School Admission Council and the Association of American Law Schools. This book includes material on the law and lawyers, pre-law preparation, applying to law schools, and the study of law, together with individualized information on most American law schools. It may be obtained at college bookstores or ordered from Educational Testing Service, Princeton, New Jersey 08540.

Master's and Doctoral Programs.—Students are admitted at the beginning of the fall semester, the spring semester, or any of the summer sessions.

Application for admission, together with all required credentials, must be received by July 1 for the fall semester, December 1 for the spring semester, and one month prior to registration for the summer session for which application is made.

Unclassified Students.—Lawyers who wish to take graduate courses are admitted at the beginning of the fall semester, the spring semester, or any of the summer sessions. Students who wish to earn credits for transfer toward a Bachelor of Laws or Juris Doctor degree at another institution are admitted to the summer sessions; they are admitted to the fall or spring semester only in unusual circumstances.

1. Application for admission, with required credentials, for a student who wishes to earn credits for transfer toward a Bachelor of Laws or Juris Doctor degree at another law school (see page 25), should be received at the Office of the Dean at least one month prior to the first day of registration for the semester or summer session for which application is made.

2. Application for admission, with required credentials, for lawyers who wish to take graduate courses (see page 25), should be received at the Office of the Dean by August 1 for the fall semester, December 15 for the spring semester, and one month prior to registration for the summer session for which application is made.

READMISSION

A student who was previously registered but did not attend during the most recent semester (summer term excluded) should file an application for readmission. Closing dates for readmission are the same as those for admission (see "Application for Admission," pages 28–29).

If the student has attended one or more higher institutions during his absence from the University or if he applies as a degree candidate and was previously a nondegree student, he must have complete, official transcripts sent to the Dean.

Registration

BEFORE ATTENDING CLASSES each student must present himself in person for registration. No student will be registered until proper credentials have been filed and approved (see "Admission").

No registration is accepted for less than a semester or one summer session.

A student may not register concurrently in George Washington University and another institution. Registration in more than one college, school, or division of the University requires the written permission of the deans concerned, *prior to registration.*

ELIGIBILITY FOR REGISTRATION

A student who is suspended or whose record is not clear for any reason is not eligible to register.

New Student.—Upon receipt of a *letter* of admission a new student is eli
gible for registration on the stated days of registration.

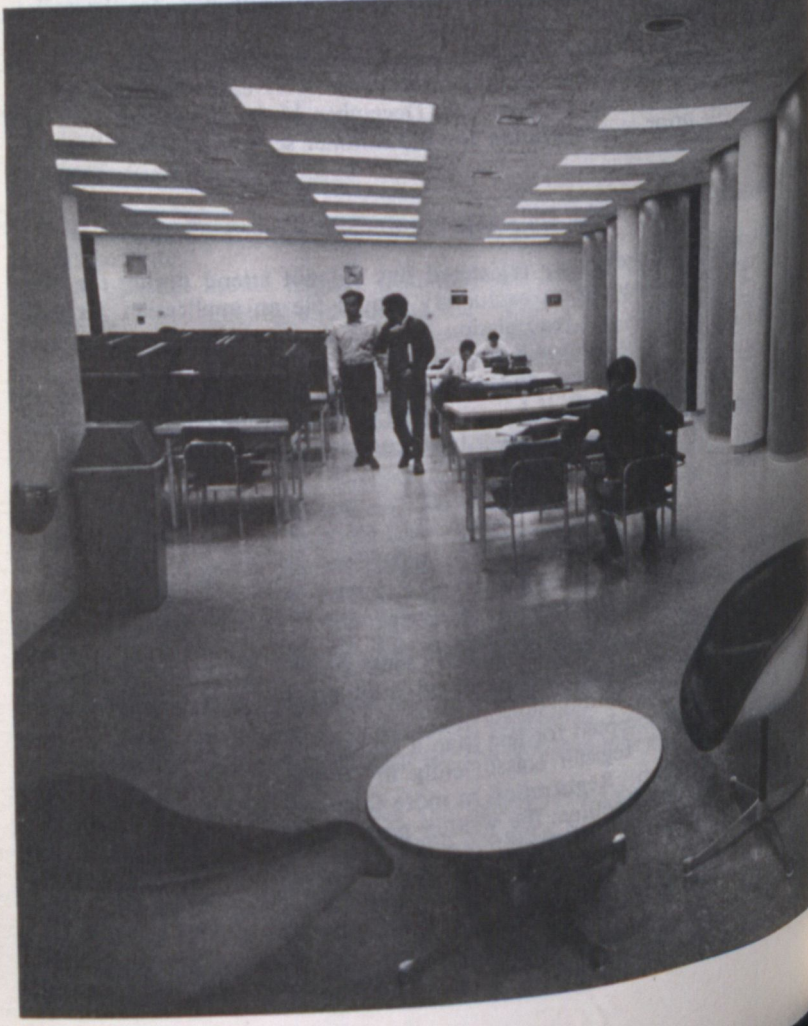
Readmitted Student.—A student previously registered who was not registered
for courses during the preceding semester or summer session must apply fo
and receive a letter of readmission (see "Readmission," above) before he i
eligible for registration.

TIME AND PLACE OF REGISTRATION

Registration is held in Stockton Hall, 720 Twentieth Street, N.W., during th
following periods: *fall semester,* August 23 and 24, *spring semester,* Januar
14 and 15.

A late-registration fee of $15 is charged each student who is permitted t
register after the regular registration days.

Registration may be changed only with the permission of the Dean.



Fees and Financial Regulations

THE FOLLOWING FEES AND FINANCIAL REGULATIONS were adopted for the academic year 1973–74. (See page 32 for projected tuition and fee increases for 1974–77.)

Tuition Fees

All law students except candidates for the degree of Doctor of Juridical Science:

Full-time program (11 to 15 hours*), each semester	$1,175.00
Part-time program or hours in excess of 15 for all candidates for the degree of Juris Doctor, for each semester hour	86.00
Part-time program for students other than candidates for the degree of Juris Doctor, for each semester hour	88.00
Doctor of Juridical Science,† including the final examination	2,450.00

University Center Fee (nonrefundable)

For students registered for 11 or more semester hours:

Each semester	37.50

For students registered for less than 11 semester hours in a semester:

For each semester hour for which the student registers	3.50

For students maintaining "continuous registration" status:

Each semester	3.50

Graduation Fees

Juris Doctor, Master's, Doctor's degrees	25.00
Fee for binding Master's Thesis	10.00
Fee for Microfilm Service (S.J.D. candidates)	30.00

Residence Hall Fees (See page 44)

Special Fees

Application fee (degree candidate), nonrefundable	25.00
Application fee (unclassified student), nonrefundable	5.00
Application fee for room reservation, nonrefundable	100.00
Tuition deposit fee charged each student admitted to J.D. degree candidacy	100.00
Fee for special examinations, for each subject	5.00
Late-registration fee, for failure to register within the designated period	15.00
Continuous Registration fee, for post-J.D. students, to maintain "continuous registration" during any semester of absence from the University or after completion of tuition requirements.‡ Due and payable on the official days of registration	88.00
Late-payment fee, charged for failure to make payments when due (see "Payment of Fees," pages 32–33)	15.00
Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," pages 32–33)	35.00

* With the prior permission of the Dean, a J.D. degree candidate may take more than 14 semester hours after his first year of study. *Any student* taking in excess of 15 hours a semester must pay the hourly rate for each semester hour in excess of 15, in addition to the full-time program fee of $1,175.00.

† The tuition fee is to be paid at the rate of $612.50 a semester for four successive semesters, exclusive of the summer term or terms. No "continuous registration" fee will be charged if a third semester is needed for completion of the degree requirements. If the Faculty should approve an extension of time, the student must maintain continuous registration and pay the continuous registration fee.

‡ The continuous registration fee applies toward neither financial nor residence requirements for the degree. This fee does not apply to students granted military leave (see page 42).

Returned check fee, charged a student whose check is returned because of insufficient funds or improper drafting $15.00
Transcript fee, for each transcript of record 2.00

Registration on campus in the University entitles each student to the following University privileges: the services of the Student Career Services Office; the use of the University Library; gymnasium privileges; admission to all athletic contests, unless otherwise specified; subscription to the *University Hatchet*, the student newspaper; admission to University debates; medical attention as described under Student Health Service. These privileges terminate and a student is no longer in residence when he withdraws or is dismissed from the University.

PROJECTED TUITION AND FEE INCREASES 1974-77

In order that students and their parents may plan more realistically, tuition increases for the academic years 1974–75, 1975–76, and 1976–77 have been estimated as follows:

*Increase by year (full-time students):
1974–75 ..... $75.00
1975–76 ..... 75.00
1967–77 ..... 100.00

Increase by semester hour (part-time students):
1974–75 ..... 4.00
1975–76 ..... 4.00
1976–77 ..... 4.00

The University Center fee will be increased for the 1974 summer session and the academic year 1974–75. For students taking 11 or more semester hours, the fee will be $43.00 a semester, an increase of $5.50. Students taking less than 11 semester hours will pay $4.00 a semester hour, an increase of $.50.

Every effort will be made to keep tuition increases within the above limits. However, it is not possible to project future economic data with certainty, and circumstances may require an adjustment in these estimates.

PAYMENT OF FEES

No student is permitted to complete registration or attend classes until all charges are paid. Tuition and fees for each semester are due and payable in full at the Office of the Cashier at the time of each registration. Checks and postal money orders should be made out to George Washington University.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. A student registered for 6 semester hours or more may sign a deferred payment contract with the Student Accounts Office at the time of each registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 31, 1973 (for the fall semester), and March 6, 1974 (for the spring semester). Interest at the rate of 8 per cent per annum on the unpaid balance

* These yearly increases are also projected for the total fee for work leading to the degree of Doctor of Juridical Science.

will be charged from the date of registration to the date payment is made. The University will not obligate itself to notify the student, in advance, of the payment-due date for the second half of the semester charges.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $525 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of 8 per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his right to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registered for credit.

In addition to the loan funds listed on page 36, there are various plans available through the Girard Bank, Philadelphia, Pa.; Funds for Education, Inc., Manchester, N.H.; and the Riggs National Bank, Washington, D.C.; by which students may, if they meet various conditions, borrow money on a relatively short-term basis.

WITHDRAWALS AND REFUNDS*

Applications for withdrawal from the University or for change in class schedule must be made in person or in writing to the Dean. Withdrawal from courses is permitted after the midpoint of a semester only in extraordinary circumstances. Notification to an instructor is not an acceptable notice.

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges and fees will be made in accordance with the following schedule for the fall and spring semesters:

1. *Complete withdrawal* from the University:

FALL SEMESTER

Withdrawal dated on or before August 31, 1973.....90 per cent
Withdrawal dated September 3 to September 14, 1973.....75 per cent
Withdrawal dated September 17 to September 28, 1973....50 per cent
Withdrawal dated after September 28, 1973.....none

*Regulations covering withdrawal and refunds for the summer session are stated in the *Summer Session Catalogue*.

SPRING SEMESTER

Withdrawal dated on or before January 25, 1974.....90 per cent
Withdrawal dated January 28 to February 8, 1974.....75 per cent
Withdrawal dated February 11 to February 22, 1974.....50 per cent
Withdrawal dated after February 22, 1974.....none

2. For a *change in status from full-time to part-time student* or for *partial withdrawal by a part-time student,* the above schedule applies to the difference in charges between the original program and the adjusted program continuing in effect.
3. A student enrolled in a full-time program who drops or adds a course and continues to be in a full-time program will have no financial adjustments of tuition made other than those involving course fees.
4. A student who is granted military leave before completing the semester will receive credits for current charges in accordance with the schedule for complete withdrawal from the University (see No. 1, page 33). Payments made in excess of the nonrefundable balance will be refunded to the student. The nonrefundable balance will be maintained as a deferred credit for use by the student when he returns to the University (see "Military Leave," page 42).
5. Regulations governing student withdrawals as they relate to residence hall and food service charges are contained in the specific lease arrangements.

In no case will tuition be refunded or reduced because of absence from classes.

Payment applies only to the semester for which a registration charge is incurred and will not be credited to another semester (exception: students granted military leave, see page 42).

Authorization to withdraw and certification for work done will not be given a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can make banking arrangements in the community.

Financial Aid

THE NATIONAL LAW CENTER has been able in recent years to assist many students in obtaining the financial aid they require, through full or partial scholarships, various loan programs, part-time employment, or a combination of these kinds of assistance.

GRADUATE AND PROFESSIONAL SCHOOL FINANCIAL AID SERVICE

The National Law Center participates in the Graduate and Professional School Financial Aid Service (GAPSFAS), which provides an analysis of an applicant's financial needs. Entering students wishing to receive financial aid should request the materials from GAPSFAS, Education Testing Service, Box 944, Princeton, New Jersey 08540. The information provided by the applicant and his parents will be analyzed, and a copy of the report will be sent to the Law Center. Students entering the National Law Center who desire to be considered for a scholarship must submit a letter to the Law Center by March 1 outlining their

academic qualifications, their extracurricular activities, and their reasons for believing a scholarship award to them is justified.

Students needing financial assistance should file with GAPSFAS in time for their reports to be received at the Law Center as early as possible since the Committee on Student Financial Aid of the Center will begin making awards in March, and available funds are limited.

No awards will be made to an entering student until his admission has been finalized.

JURIS DOCTOR PROGRAM

SCHOLARSHIPS AND RESEARCH ASSISTANTSHIPS

Application and correspondence concerning scholarships and research assistantships should be sent directly to the Dean. Unless otherwise specified, application and supporting credentials should be submitted no later than March 1 preceding the period for which the award is made.

Arent, Fox, Kintner, Plotkin & Kahn Scholarship (1973).—Scholarship aid for needy law students from the Washington, D.C., area.

Mildred Gott Bryan Scholarship Fund (1965).—Partial scholarship aid for students in the National Law Center.

Charles Worthington Dorsey Memorial Scholarship (1947).—Memorial to Charles Worthington Dorsey, LL.B. 1881, LL.M. 1882. A full-tuition scholarship for the course leading to the degree of Juris Doctor, awarded to a needy and promising graduate of this University with a Bachelor of Arts or equivalent degree. Ordinarily this scholarship is awarded once every three years.

Honor Scholarships.—Two scholarships available each year to students entering upon full-time study. Each scholarship provides a cash award for the first year, in addition to tuition aid, in an amount depending on need, for all three years. These scholarships are awarded on the basis of outstanding college records, both academic and extracurricular; Law School Admission Test scores; and need. To retain the scholarship for the second and third years, the candidates must maintain a *B* average, both for each year and cumulative.

Law Center Tuition Remission.—For students from minority groups, based on financial need.

Phi Delta Delta Scholarships (1959).—Zeta Chapter of Phi Delta Delta Legal Fraternity (International), provides tuition aid to a woman student in the second year of the Juris Doctor program who excelled in scholastic achievement and service to the Center in her first year.

Research Assistantships.—Available each year to students currently enrolled. Each assistant receives an annual stipend. Awards are made on the basis of academic standing, financial need, capacity for leadership, and research and writing potential. Applications should be submitted no later than July 1.

Research Scholarships.—Available each year to students currently enrolled, preferably to applicants who are completing the second year. Scholarship awards are made on the basis of academic standing, financial need, capacity for leadership, and research and writing potential. Applications should be submitted no later than June 1.

Trustee Scholarships.—Scholarships awarded each year to entering students, full tuition aid, in an amount depending on need, in the morning division. Candidates must have demonstrated qualities of leadership in addition to scholastic achievement. To retain the scholarship, the successful candidate must maintain

a *B* average, both for each year and cumulative. Application must be made to the Dean before March 1.

Tuition-aid scholarships are also available to continuing second- and third-year full-time students with demonstrated scholastic ability, on the basis of financial need and capacity for leadership. Application should be made to the Dean prior to June 1.

Frank S. Whitcomb Scholarship Fund (1971).—Bequest of Frank S. Whitcomb "for the purpose of aiding and assisting worthy young men in securing a legal education."

LOAN FUNDS

Through the generosity of friends of the University a number of loan funds are available. Among them are the Robert Ash Loan Fund; the George B. Beneman Loan Fund; the Morris and Gwendolyn Cafritz Foundation Minority Law Student Loan Fund; the Robert M. and Mary McConnel Cooper Loan Fund; the Robert McKinney Cooper Memorial Loan Fund; the District of Columbia Bar Association Loan Fund; the J.W. Ehrlich Foundation Loan Fund; the Harold L. and Violet George Foundation Loan Fund; the George Washington Law Association Loan Fund; the Jephson Educational Trust Loan Fund; the Law Association Loan Fund for the law classes of 1912, 1918, 1923, 1924, 1929, 1931, 1933, 1935, 1936, 1937, 1938, 1939, 1941, 1942, 1945, 1950, 1951, 1952, 1953, 1955, 1959, 1960, 1961, 1962, 1963, 1964, 1965, the Oscar Lawler Memorial Loan Fund; the Horace L. Lohnes Memorial Assistance Fund; the Jessie B. Martin Loan Fund; the Mike Pelekiri Loan Fund; the W. Theodore Pierson Loan Fund; and the Orville Hassler Walburn Memorial Loan Fund.

In addition, financial assistance is available through the Guaranteed Student Loan Program, National Defense Education Act loans, the American Bar Association Loan Program, and other sources.

Application for financial assistance should be made in the Office of the Dean.

MASTER'S AND DOCTORAL PROGRAMS

SCHOLARSHIPS, FELLOWSHIPS, AND RESEARCH OPPORTUNITIES

Application should be made before March 1 preceding the period for which the award is made. The applicant should submit an application for admission

as a degree candidate and a personal letter applying for a fellowship to the Dean. The letter of application should contain complete biographical data, information as to experience in practice or teaching and his draft or military status, copies of or citations to his published legal writings, and such other information as he believes will be of assistance in the consideration of his application. He should arrange for letters of recommendation to be sent from two members of his law faculty directly to the Dean. His academic rank in class should be included either in the transcript of his law school record or in the letters of recommendation.

Richard Paul Momsen Scholarships for Brazilian Graduate Law Students.—Bequest of Richard Paul Momsen, LL.B. 1912. Awarded 1974–75 and alternate years, for the study of U.S. constitutional law and the law of patents and trademarks.

Teaching Fellowships.—Two fellowships available each year with a stipend of $6,000 plus tuition for an approved course of study leading to an advanced degree. Teaching fellowships are awarded for a term of two academic years. Fellows conduct the first-year course in Legal Research and Writing and work with the students to improve their legal writing ability. By arrangement with the Dean, they are also given the opportunity to teach additional courses.

Research Study Opportunities.—Research assistantships providing opportunity for graduate study with the program of Law, Science, and Technology.

Prizes

Jacob Burns Prize.—Established by Jacob Burns, a law alumnus and Trustee of the University. A medal and $100 awarded annually to each of the two members of the winning team in the upperclass Van Vleck Moot Court competition.

Ogden W. Fields Graduate Prize.—Fifty dollars awarded annually to the graduate student who has demonstrated the highest overall proficiency in a course in labor law.

Charles Glover Prize.—Established by Charles Carroll Glover, Jr., an Honorary Trustee of the University, in memory of his great-grandfather, an illustrious member of the bar of the District of Columbia. Consists of selected law books. Awarded annually to the student who has attained the highest average grade in the third-year, full-time course.

Kappa Beta Pi Prize.—Twenty-five dollars awarded annually by Eta Alumnae Chapter to the woman law student who attains the highest average for the first year.

John Bell Larner Prize.—By bequest, a medal awarded annually to the member of the graduating class who attains the highest average grade in the entire course for the degree of Juris Doctor.

John Ordronaux Prizes.—By bequest, $75 awarded annually to the student who has attained the highest average grade in the first-year full-time course; and $75 to the student who has attained the highest cumulative average grade at the end of the second-year, full-time course.

Lonnie Hassler Walburn Prize.—A cash reward to the outstanding student in the field of civil procedure, established by the will of the late Professor Orville Lonnie Walburn in memory of his mother.

Regulations

ACADEMIC WORK LOAD

Juris Doctor Candidates.—Juris Doctor candidates without substantial out-
side employment may take a program of studies of 14 hours a week. Such stu-
dents may take courses in the evening only if they are not scheduled in the day
time and if a majority of the hours taken are in day courses. The Dean is
authorized to approve programs of study of more than 14 hours in exceptional
cases; however, no program will be approved which would permit the student
to complete requirements for the degree in less than 28 months after he begins
his first year of law study. Students with 20 hours or more of outside employ
ment, whether in the day or evening division, must take a limited program of
studies not exceeding 10 hours a week. Students taking a majority of their
classes in the evening may not take more than 10 hours a week; the minimum
load is 8 hours, except in special cases where 6 may be approved by the Dean
for a limited time. A minimum schedule of 11 hours in the day division is
required except in exceptional circumstances when a reduced program is au-
thorized by the Dean.

Students taking more than 8 hours in the day division or 4 hours in the
evening division must have the permission of the Dean to take a Bar Review
course.

Students may transfer from the day division to the evening division only
with the permission of the Dean.

With the approval of the Dean, second- and third-year students may take a
maximum of 6 semester hours of appropriate courses in other departments of
the University; such a student must receive a grade of at least *B* to obtain credit
for such courses, and in no event will the grade count in computing his cumu-
lative average.

Master's Candidates.—Master's candidates without substantial outside em-
ployment may take a maximum of 12 hours a week. Students with 20 hours
or more of outside employment must take a limited program of study not to
exceed 8 hours a week. The minimum load is 4 hours unless approval for
fewer hours is given by the Dean for a limited time.

ATTENDANCE

Regular attendance at classes is required and is necessary for successful work.
A student who is deficient in class attendance in any course may be barred
from taking the examination.

CHANGES IN PROGRAM OF STUDIES

A student may not add courses or change from one section to another of the
same course without the approval of the Dean. Students may drop courses
only with the written approval of the Dean. In addition, approval of the in-
structor is ordinarily required unless the request is made early in the semester.
Under no circumstances may any student drop a course after the last day be-
fore regularly scheduled examinations begin in any semester or summer
session.

RESEARCH PAPER IN LIEU OF EXAMINATION

The preparation of a research paper is required in lieu of an examination in seminars and in other courses, as indicated in the course descriptions. Any research paper must be submitted by the first day of the examination period (the first day any examination is given in any course). For sufficient reason, the instructor may extend the time beyond this date to a later date, subject to the following conditions: (1) no student will receive any credit for the course for any purpose until a paper acceptable to the instructor has been submitted; (2) if a paper is submitted after the last day of examinations (or the last day before registration for the spring semester), the only grade the student may receive for the course is *CR* (Credit) or *NC* (No Credit), except that failure ultimately to submit any paper for the course will result in a grade of 45. Students who are candidates for the J.D. degree may register for one such course each semester of their third year; with the approval of the Dean such students may register for more than one such course each semester. Approval of the Dean is required for second-year students to take such courses.

EXAMINATIONS

Written examinations are held at the end of most courses. Every student is required to take the regular examinations unless excused. No excuse for absence will be granted except by the Dean and then only for illness or other emergency. Application for excuse must be made in writing not later than one month after the date of the examination. A student excused from a final examination will be permitted to apply to the instructor for a Credit/No Credit determination. The instructor will select the mode of determination (for example, a make-up examination or paper). The student will have the option of (1) complying with the instructor's procedure of determining Credit/No Credit, or (2) leaving the grade *I* (Incomplete) entered on his record and taking the next regularly scheduled examination for a numerical grade. The examination may not be taken after exclusion for low scholarship.

Permission to take an examination before the regularly scheduled date will not be granted. Permission to take a postponed examination is limited to the situations provided for in the preceding paragraph.

A student who has been excused from taking a regular examination and who is a candidate for a degree to be conferred prior to the next regular examination in the subject may petition the Scholarship Committee, which may authorize such action as the circumstances require.

If a student fails to take an examination, a grade of 45 will be recorded unless he has been excused from the examination as provided above or has obtained the Dean's permission to drop the course.

CREDIT/NO CREDIT OPTION

Candidates for the degree of Juris Doctor may take, in addition to courses regularly given on a "Credit/No Credit" basis, 12 semester hours of elective course work on a "Credit/No Credit" basis, and will receive a grade of "Credit" if the course is satisfactorily completed with a grade of 65 or better. No student may change from a numerical grade to a "Credit/No Credit" basis in a course during the last four weeks of classes except with the permission of the

instructor. An unexcused failure to take an examination in a course or failure to submit a required research paper will result in the recording of a grade of 45 for a course taken on a "Credit/No Credit" basis.

No student may take more than 17 semester hours of courses (including Law 220 and also courses regularly given on a "Credit/No Credit" basis) on a "Credit/No Credit" basis.

Students are advised to consider carefully the advisability of electing to take courses on a "Credit/No Credit" basis. In the opinion of the faculty, a student's election to take courses on a "Credit/No Credit" basis may, in view of the importance apparently attached to grades by educational institutions and employees, be detrimental to the student's career in the legal profession.

GRADES

Grades are given in numerical terms equivalent to letter grades as follows: 85–100, *A*, Excellent; 75–85, *B*, Good; 65–74, *C*, Satisfactory; 55–64, *D*, Poor —below standard for graduation; 45–54, *F*, Failure. In courses Law 220, 322, 22, 323, 342, 343, 345, 346, 385, 399, 459, 479, 487, 509, 579, and 58 grades are *CR*, Credit; *NC*, No Credit. A student who has been excused from failure to take a regularly scheduled examination is given the grade of *I*, Incomplete, and a student who has been barred from taking an examination because of excessive absences is given the grade of *EA*. See "Examinations" (page 39) for grade upon failure to take an examination. Grades between 55 and 100 indicate that the work has been completed and credit given. Grades between 55 and 64, however, do not represent satisfactory work and adversely affect a student's cumulative average. No credit is given for grades below 55. A student may not repeat a course he has failed.

The cumulative average of a student includes all grades in all courses taken while he is a candidate for a particular degree. When a course is repeated (see "Academic Dishonesty," page 42), both the first grade and the subsequent grade or grades are counted in the cumulative average.

EXCLUSION AND PROBATION FOR POOR SCHOLARSHIP

Candidates for the Degree of Juris Doctor.—A student whose cumulative average at the end of any semester falls below 65.0 but is above 64.0 will be notified that he is on probation. If such a student fails to raise his cumulative average to 65.0 at the end of the next semester, he will not be permitted to register for any succeeding semester unless he petitions for and receives the permission of the Scholarship Committee.

A student whose cumulative average at the end of any semester falls below 64.0 will not be permitted to register for any succeeding semester unless he petitions for and receives the permission of the Scholarship Committee to register.

A student who fails more than one course over his entire period of law study will not be permitted to register for any succeeding semester unless he petitions for and receives the permission of the Scholarship Committee.

A student who is not permitted to register under the foregoing provisions will be excluded as of the beginning of the semester for which he was ineligible to register.

Students who are registered at the time they receive notice that they will not

be permitted to register for the next semester are entitled to withdraw from school and to receive a full refund of the tuition for the semester, or to complete the work for which they are registered.

Any student excluded may petition for reinstatement; if he can demonstrate that his low grades were due to circumstances beyond his control and that he has the capacity to pursue the study of law with a definite likelihood of success, he may be readmitted subject to such conditions as may be imposed by the Scholarship Committee.

Despite the above provisions, a student will be allowed to complete his first two semesters of law study before he is denied permission to register for a succeeding semester.

The term "semester" includes a session of the summer term.

Candidates for Masters' and Doctoral Degrees.—A candidate for a Master's or doctoral degree whose work is not satisfactory in the opinion of the faculty, taking into consideration the requirements and standards for the degree, may, by action of the faculty, be excluded at the end of the semester for which he is currently registered.

A cumulative average of 75 is required for the Master of Laws degree. A student whose cumulative average falls below 75 at anytime will be ineligible for continuation in the program without the permission of the Dean. He will not be permitted to register for any succeeding semester unless he petitions for and receives the permission of the Dean or the Board for Graduate Studies.

Unclassified Students.—An unclassified student whose work is not satisfactory may be excluded at the end of the semester for which he is currently registered.

SUMMER SCHOOL CREDIT

Students planning to attend summer school sessions at other law schools and desiring to use credits obtained at such schools in their Juris Doctor program at this Center must first have the courses they wish to take approved by the Dean. In no event will credits be recognized in excess of those which might be obtained in a similar period in this program.

TRANSCRIPTS OF RECORD

Official transcripts of student records will be issued on request of the student or former student. A fee of two dollars is charged for each transcript. No transcript will be issued for a person who does not have a clear financial record.

CONTINUOUS REGISTRATION

Degree candidates are expected to maintain continuous registration until *all* degree requirements are satisfied. By failing to register for one semester or more, the student breaks his registration and must be readmitted (see "Readmission," page 29). A "Readmitted Student" is required to satisfy the curriculum requirements existing at the time of his readmission. Post-J.D. students who have completed course registration may maintain continuous registration by paying the "continuous registration" fee (see page 31); *J.D. degree candidates may not maintain continuous registration by paying the "continuous registration" fee.*

GRADUATION REQUIREMENTS

Diplomas are awarded at a February Convocation, at a May Commencement, and in September.

To be recommended by the Faculty for graduation, a student must have met the admission requirements of the National Law Center; completed satisfactorily the scholarship, curriculum, residence, and other requirements for the degree for which he is registered; and be free from all indebtedness to the University. Registration, either for course work or on the "continuous registration" fee basis, is required for the semester or summer session immediately preceding the awarding of the degree.

Application for Graduation.—An "Application for Graduation" form must be filed and the appropriate fee paid at the time of registration for the last semester or summer session of the final year. Students completing degree requirements during the Summer Sessions will be awarded diplomas (no formal convocation) September 30, *provided* they have completed all degree requirements and have applied for graduation as a part of registration for the Summer Sessions.

ACADEMIC DISHONESTY

Academic dishonesty on the part of any student will result in a disciplinary grade of *F* for the course involved and also may, upon the recommendation of the Dean's Council, result in his suspension from the University for a stated period, at the end of which time he may petition for readmission. Upon approval of the Dean's Council, the disciplinary grade of "Failure—Academic Dishonesty" will be recorded for the course involved, and this grade will be employed in the computation of the cumulative average. A student so suspended shall be withdrawn from all other courses except those in which all work has been completed.

MILITARY LEAVE

A student called to active duty may be granted military leave for the period of active duty, upon presentation to his Dean of a copy of his orders and a petition for such leave. The maintenance of "continuous registration" is not required of the student on military leave; however, he must apply for readmission to the University well in advance of the semester in which he expects to return. Payments for tuition and fees which are not refunded to the student at the time he is granted military leave will be maintained as a deferred credit for his account and use upon return to the University.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

In general, the policy of the University is one of attempting to keep the student's record confidential and out of the hands of those who would use it for other than legitimate reasons. At the same time, the policy must be flexible enough not to hinder the student, the University, or the community in their legitimate endeavors.

No information concerning a student will be released except as noted below.

1. Information such as whether or not the student is currently enrolled, dates of attendance; verification of date and place of birth; degrees earned,

if any, date, major field or area of concentration, and honors received; home and local addresses and telephone numbers; school, college, or division of enrollment, and class; verification of signature; name and address of parent or guardian.

2. The issuance of formal transcripts of record to recognized institutions of higher learning; the certification of academic achievement to the various recognized professional associations (law, medicine, engineering, education, etc.).

Additional information will be released only on written authorization from the student, or by court order or subpoena. If a subpoena is served, the student whose record is being subpoenaed will be notified and the subpoena will be referred to the University's legal counsel.

Government investigative agencies have no inherent right to access to student files and records. If expressly requested, properly identified representatives from federal, state, or local government agencies may be given the information listed under No. 1 above.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

RIGHT TO DISMISS STUDENTS

If a student knowingly makes a false statement or conceals material information on an application for admission, registration card, or any other University document, his registration may be canceled and he will be ineligible (except by special action of the Faculty) for subsequent registration.

The right is reserved by the University to dismiss or exclude any student from the University or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable to do so.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

PROPERTY RESPONSIBILITY

The University is not responsible for the loss of personal property in any University building. A "Lost and Found" Office is maintained in the Campus Security Office.

RECENTLY ESTABLISHED REGULATIONS

An Appendix (pages 96–98) contains regulations recently approved by the University's Board of Trustees.

University Computer Center

THE UNIVERSITY COMPUTER CENTER is located on the first floor of Stuart Hall, 2013 G Street, N.W. The facilities of the Center are available for academic purposes to all registered students and to members of the instructional staff. The Center has as its principal mission the provision of a powerful computing system which serves the University in its educational and research endeavors. The Center's programming staff concentrates its efforts in conducting faculty and staff seminars, consulting with users in the preparation of complicated programs, and carrying out computer-oriented research.

The Computer Center equipment consists of an IBM system 370 model 145 computer with large capacity on-line disk storage, a card read/punch, a high-speed line printer, and four tape drives. The principal languages available to the user are FORTRAN IV, COBOL, Programming Language One (PL/1), Assembler Language, and ALGOL. In addition, numerous utility, statistical, data manipulation, and simulation systems and special languages are available in the library of programs. Facilities are available on a first-come, first-served basis for preparation of programs and data.

Computer programming courses are offered by the School of Government and Business Administration, the Department of Statistics, and the School of Engineering and Applied Science. In addition, many other departments offer courses that utilize the computer as a research adjunct to course work.

The Computer Center is normally open 24 hours a day.

Student Services

RESIDENCE HALLS

COMPLETE INFORMATION concerning the University's residence halls is available from the Director of Housing, George Washington University, Washington, D.C. 20006. Information concerning off-campus housing near the University may be obtained at this Office. The reservation of rooms in private houses must be made by students.

Admission to the University does not include a room reservation. Information concerning housing may be obtained by writing directly to the Director of Housing, George Washington University, Washington, D.C. 20006.

1973-74 RESIDENCE HALL RATES PER PERSON FOR TWO SEMESTERS*

Madison Hall, double room, $825 per student; Graduate Hall, apartment for three (apartments in this hall have kitchen facilities), $875 per student.

FOOD SERVICE*

Food service is available from September 4 through December 21, 1973, and from January 10 through May 4, 1974, with vacation periods and holidays excluded. The rate for the seven-day, 20 meals per week plan is $700 for the academic year; the rate for the five-day, 15 meals per week (Monday through

* Residence hall and food service prices subject to change.

Friday) plan is $660 for the academic year. The well-balanced meals are served cafeteria-style.

MUNSON HALL APARTMENTS

Munson Hall is a University-owned and operated apartment house containing 15 one-bedroom and 54 efficiency apartments. Graduate and married students are given priority for residence until July 15 each year. All leases are for one 12-month year.

CLOYD HECK MARVIN CENTER

The Cloyd Heck Marvin Center serves as the campus community center, providing services, conveniences, and recreational and social opportunities for students, faculty, staff, alumni, and guests. Its wide range of facilities provides the setting for a variety of programs conducted by the University Program Board; the departments of Drama, Dance, and Music; and other student and faculty organizations.

A two-board structure, representative of all elements of the University community, plays an important role in the day-to-day functioning of the Center. The Governing Board and the Operations Board work closely with the full-time staff in the development of procedures and policies which provide a framework for the Center's operation.

STUDENT HEALTH SERVICE

The Student Health Service is a general outpatient clinic designed to assist students registered on campus with their health needs. This Service is located at 1935 22nd Street, N.W. (in the H.B. Burns Memorial Building).

Physicians are present during the academic year from 9 a.m. to 5 p.m. and from 6 p.m. to 10 p.m., Monday through Friday, and from 9 a.m. to 12 noon on Saturday. This schedule is also maintained during the Summer Sessions, except that the evening closing hour Monday through Friday is 9 p.m.

During hours when the Student Health Service is closed, on-campus students may contact consulting physicians for advice connected with illness or emergency by calling 223-2200 (the Medical Bureau). All callers should always identify themselves as George Washington University students and ask for the physician-on-call. For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. This arrangement is for emergency care only, and all fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receive treatment at the Student Health Service. A student who is not currently enrolled or who has severed his connection with the University is ineligible for medical benefits of the Student Health Service. Any student may engage, if he so desires, physicians and nurses of his own choice, but he will be responsible for all the fees charged. The bills incurred from all services rendered outside of the Student Health Service (for example, laboratory and X-ray work and referrals to specialists or other outside physicians) are the responsibility of the student. Within the Student Health Service, there will be only a few small charges for some services, such as materials for an allergy injection series, overseas immunizations, and certain other services.

Any student who intends to train for an athletic team is required to pass
thorough medical examination. The University is not responsible for injur
received in intercollegiate or intramural games, or in any of the activities
the Department of Physical Education, Health, and Recreation.

HEALTH AND ACCIDENT INSURANCE

The Student Health Service Office has arranged for Health and Accident Insu
ance, on an elective basis, for *full-time* students registered on campus. Interest
students should contact the Student Health Service Office.

STUDENT EMPLOYMENT

The Law Center helps in the placement of its students and maintains a place
ment service for that purpose. In addition, the Student and Alumni Caree
Services Office, Woodhull House, 2033 G Street, N.W., provides assistance
students seeking full-time, part-time, or temporary employment. This Offic
maintains a registry of positions available and refers qualified applicants for
consideration. Information is also available on Civil Service examinations.

A student taking more than ten semester hours must limit outside employ
ment to less than twenty hours (see "Academic Work Load," page 38). I
is urged that full-time students refrain from engaging in outside employment
during their first year. Although work in some special areas may contribute
to the learning and experience of the student, as a general rule it will compete
with time needed for adequate study and preparation, which are at the heart o
a good legal education.

PLACEMENT SERVICE

The Law Center takes a continuing interest in the placement of its graduate
in private practice and governmental service as well as with industry and com
merce. The Dean, the Faculty, and the Placement Office cooperate in collec
ing information from alumni, law firms, and government agencies concerning
opportunities in legal positions throughout the country. Senior law students
and recent graduates are urged to keep in touch with the Placement Office.

VETERANS EDUCATION

The Office of the Registrar, Luther Rice Hall, 2121 Eye Street, N.W., assists
students entitled to educational benefits as veterans or war orphans with any
problems which may arise concerning their benefits. This Office also processes
certification of enrollment and attendance to the Veterans Administration so
that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or war orphans should
consult the Office of the Registrar prior to submitting application to the Veter
ans Administration. All such students should obtain the instruction sheet pu
sued by the Office of the Registrar, which sets forth requirements to be fulfille
before certification of enrollment can be made to the Veterans Administration
and which includes other information of general interest.

The Veterans Administration is at 2033 M Street, N.W., Washington, D.C.
20421.

COURSES OF INSTRUCTION

THE COURSES OF INSTRUCTION listed below are subject to change. The Univ
sity reserves the right to withdraw any course announced.

The number of hours of credit given for the satisfactory completion of
course is indicated in parentheses after the name of the course. Thus, a ye
course giving two hours of credit each semester is marked (2–2), and a seme
ter course giving two hours of credit is marked (2).

In most courses, a final examination is held during the examination perio
and the grade in the course is determined in large part by that examinatio
These courses are parenthetically marked "Examination."

Courses that require the preparation of a major research paper in lieu of
examination are parenthetically marked "Research Paper." The satisfacto
completion of such a paper by a student individually will satisfy the Leg
Writing curriculum requirement for the J.D. degree.

Courses parenthetically marked "Problem Assignments," "Writing Assig
ments," "Take-home Examination," "Choice of Paper or Examination," o
"Clinical Work" indicate the nature of the method planned by the instructo
for determining in major part the grade he will give for the course. A cour
marked with any of these designations will not satisfy the Legal Writing curr
ulum requirement for the J.D. degree.

Day classes begin at 9:10 a.m. and run throughout the entire morning an
afternoon. Evening classes begin at 5:50 p.m. Many examinations for bo
day and evening classes may be given in the afternoon only. Examinations f
day students may be held in the evening only.

A parenthetical designation at the end of a course description indicat
whether the course is scheduled to be offered in the spring or fall semester
in the summer sessions, and also usually whether it will meet in the day
evening. When a double-numbered course is designated "Academic year," t
first half of the course is scheduled to be offered in the fall, the second ha
in the spring. Courses with no parenthetical designation indicating time
offering are not scheduled to be given during the 1973 summer sessions or
1973–74 academic year.

COURSES FOR JURIS DOCTOR CANDIDATES

Required courses are numbered from 201 to 300. Courses numbered from 3
to 400 are normally taken by second- and third-year students. Courses nu

bered from 401 to 600 are generally more advanced. Second-year students may take courses numbered above 400 only with the permission of the Dean. Third-year students are encouraged to take one course numbered above 400 each semester, and may take more than one such course with the permission of the Dean.

The following courses are among those offering clinical work: Law 343, 345, 346, 394, 396, 399, 458, 459, 479, 487, 509, 535, 579.

REQUIRED COURSES

203–4 **Contracts I–II** (4–2) Nash, Cibinic, Pock, Ginsburg

Legal remedies of contracting parties, including damages in contract and quasi-contract, specific performance, reformation, recission, remedies in tort; acts creating and terminating contractual rights, including offer and acceptance, mistake, problems of proof; function of consideration; conditions; assignments; third-party beneficiaries; effect of changed circumstances; protection of the client's interests upon breach or threat of breach by the other party. Emphasis on problems of analysis, draftsmanship, adversary method. (Examination) (Academic year—day and evening)

207 **Torts** (4) Merrifield, Seidelson, Park, Banzhaf, Schwartz, Sirulnik

Liability for harm to person or property. Intentional torts, negligence, nuisance, products liability, misrepresentation, defamation, and invasion of privacy; fault and other basis for shifting losses; causation; damages; effects of liability insurance; problems under Federal Tort Claims Act. (Examination) (Fall—day and evening)

211 **Property** (4) Starrs, Schiller, Brown, Reitze

Basic concepts of personal property. Real property: historical background of the law of estates and conveyancing, types of estates, dower and curtesy, landlord and tenant relationship, concurrent estates, future interests at common law and after the Statute of Uses; introduction to modern conveyancing—the real estate contract, the deed, the recording system, methods of title assurance. (Examination) (Fall—evening; spring—day; summer 1973)

212 **Constitutional Law** (4) Dixon, Miller, H. Green, Mayo, Barron

Basic principles of American constitutionalism; judicial function in constitutional cases; implementation of doctrines of separation of powers, federalism, limited government; development and exercise of national powers; introduction to civil rights and liberties. (Examination) (Spring—day and evening)

215 **Criminal Law and Procedure** (4) Starrs, Allen, Robinson, Ferster

Origin and purposes of criminal law; elements of criminal liability; mental disorders; crimes against the person, property, and against both; statutory offenses; criminal procedure, with consideration of Federal Rules of Criminal Procedure. (Examination) (Fall—day; spring—evening)

218 **Civil Procedure** (4) Sharpe, Schwartz, Park, Ferster, Kayton, Barron

Mechanics of litigation—rules which govern the process by which rights and duties studied in substantive law courses are enforced; pleadings, discovery, pre- and post-trial motions, jurisdiction and venue, equity jurisdiction and trial by jury, former adjudication. Emphasis on Federal Rules

of Civil Procedure, but principles and main problems indigenous to ... procedural systems are developed. (Examination) (Spring—day and evening)

220 **Legal Research and Writing** (2) Seidelson and Staff

Introduction to and practical experience in the use of a law library; ... struction and practice in legal writing, including a memorandum and ... appellate court brief; instruction and experience in the preparation and ... argument of an appellate court case. The grade *CR* (Credit) or *NC* (No ... Credit) is given for this course. (Fall—day and evening)

232 **Evidence** (4) Seidelson, Robinson, Alber...

Preparation and presentation of evidence, including proof of writing, ... qualification and examination of witnesses with emphasis on impeachment, ... privilege; opinion testimony; determination of relevancy; demonstrative ... experimental, scientific evidence; application of the hearsay rule. (Exami... nation) (Spring—day and evening; summer 1973)

ELECTIVE COURSES

302 **Admiralty** (2) Sharpe

Doctrines originating in admiralty courts—prize, maritime, liens, salvage, ... general average, negligence in ship collisions and otherwise, maintenance ... and care, unseaworthiness; maritime law from legislative origins—personal ... injury and death remedies, limits on shipowners' liability, regulation of ... carriage of goods and persons; admiralty jurisdiction and maritime law in ... the federal system. (Examination) (Spring—day) Mallison

304 **United Nations Law and World Order** (2)

(Formerly Law 391)

Introduction to international law through study of law and practice of ... United Nations Charter; structure and process of decision of United Na... tions; maintenance of international peace and security—peaceful settle... ment of disputes and national and collective self-defense; formulation and ... implementation of human rights. Complements but does not repeat the ... material in Law 305. (Examination) (Fall—day and evening) Mallison

305 **International Law and World Order** (3)

(Formerly Law 303)

Traditional content of introductory course in international law presented ... in context of values and institutions of world community; emphasis upon ... national states as participants in decision-making processes with considera... tion also of individuals, international public organizations, political par... ties, pressure groups, private associations; analysis of range of available ... sanctions; roles and effects of international agreements under United States ... Constitution; introduction to the law of war. Complements but does not ... repeat material in Law 304. (Examination) (Spring—day and eve... ning) Albert, Liebesny

307 **Comparative Law** (3)

A general introduction to the world's main legal systems with emphasis ... on civil law. Comparative study of the administration of justice, pro... cedural problems, and selected substantive legal institutions. (Exami... nation) (Spring—day)

309 **Conflict of Laws** (3) Dixon, Seidelson, Pock, D. Green

Legal problems arising from occurrences transcending state or national boundaries; jurisdiction; foreign judgments; constitutional influences; theoretical bases of choice of law principles and their application to specific fields, including torts, contracts, property, family law, administration of estates, business associations. (Examination) (Fall—evening; spring—day; summer 1973)

311 **Agency and Partnerships** (2) Sharpe, Schiller

Legal principles concerning association in business by agency, partnership, other unincorporated forms, and corporations; creation, form and nature of agency, partnership and corporation; basic principles of agency and partnership and introductory related principles of corporation law. (Examination) (Fall—day and evening; summer 1973)

312 **Corporations** (4) Kirkpatrick, H. Green, Stevenson

Corporate law, with emphasis on operations and financing of corporations. Control of corporations, action by corporate directors, officers, shareholders. Control devices. Directors' and shareholders' duties of care and loyalty, insiders' transactions in shares of the corporation. Derivative suits, kinds of shares, dividends, corporate distributions. (Examination) (Fall—day; spring—evening; summer 1973)

313 **Sales and Sales Financing** (2) Albert, Rothschild, Ginsburg

Provisions of the Uniform Commercial Code relating to sale and distribution of goods, including bulk transfers, warehouse receipts, bills of lading, and other documents of title; particular attention to secured transactions and financing devices utilized in this connection. (Examination) (Fall—day and evening; summer 1973)

314 **Commercial Paper, Check Collection, and Banking** (2) Albert, Rothschild, Schwartz, Ginsburg

Classic view of negotiable instruments as codified by Article III of the Uniform Commercial Code. Check collection: the system in theory as expressed in Article IV of the Uniform Commercial Code and the system in practice; Federal Reserve regulations, Clearing House agreements, and automation systems. The dual banking system, work of the Comptroller General and the Federal Reserve Board. Legal problems concerning interest and the checkless society. (Examination) (Spring—day and evening; summer 1973)

318 **Creditors' Rights** (3) Kirkpatrick

Creditors' remedies outside bankruptcy—compositions, agreements, general assignments; bankruptcy proceedings under the federal statute, administration, discharge, the position and powers of the trustee, preferences; corporate reorganization under Chapter X of the Bankruptcy Act. (Examination) (Fall—day and evening)

321-22 **Current Decisions** (2–2)

Limited to members of the student staff of the *Law Review*. A maximum of 4 semester hours of credit may be earned in this course. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Academic year—day and evening)

323 **International Law** (1 or 2)

Limited to editors of the student staff of the *Journal of International L and Economics*. The grade *CR* (Credit) or *NC* (No Credit) is given this course. (Fall and spring—as arranged)

325–26 **Trusts and Estates I–II** (3–3) Weaver, Ku

Noncommercial transfers of wealth at death or during life. Law 32 essential elements and formalities for creation of trusts and execution wills, revocation and alteration, grounds for contest, limits on prope owner's power to control, intestate succession. Law 326: disposit provisions, common questions of construction, future interests problem administration of estates and trusts, charitable trusts. Prerequisite to Lo 325: Law 211; to Law 326: Law 325. (Examination and Problem A signments) (Academic year—day and evening; summer 1973—L 325)

327 **Modern Real Estate Transactions** (2) Schiller, Bro

Advanced problems in conveyancing; private control of land use—eas ments, covenants, equitable servitudes; planning and zoning—the form of zoning, appraising the purposes of zoning ordinances, municipal a thority to zone against the will of other governments, due process in zo ing matters, nonconforming uses. (Examination) (Spring—day)

329 **Unfair Trade Practices** (3) Weston, Harris, Bamb

Unfair trade practices at common law and under statutes; trademark trade names; copyright law; misappropriation of ideas; protection of com petitors and consumers against false advertising under Federal Trade Commission Act; resale price maintenance under state Fair Trade Acts; state sales-below-cost statutes; Robinson-Patman Price Discrimination Act miscellaneous business practices. (Examination) (Fall—day and eve ning)

330 **Federal Antitrust Laws** (3) Weston, Kirkpatrick

Sherman and Clayton Acts, related statutes. Price-fixing agreements an other types of trade restraints considered under Section 1; monopolizing considered under Section 2 of the Sherman Act. Mergers and tie-in sales other activities under the Clayton Act. All types of business conduct raising questions under the antitrust laws, including trade association ac tivities, exclusive-dealing arrangements, boycotts, patents and copyrights (Examination) (Spring—day and evening)

331 **Product Liability** (2)

Development of the concept of product liability and consumer's remedies Specific problems and processes in evaluation of risk and benefit, en countered in government regulation of dangerous and defective products Survey of civil actions for harm resulting from defective and dangerous products with reference to parties and proof in negligence, warranty, nui sance, fraud, misrepresentation, and other cases. Problems associated with hazard identification, insurance, and industry self-regulation. Review o Consumer Product Safety Act and current legislation dealing with in juries and remedies in specific areas. (Research Paper)

332 **Federal Jurisdiction** (2) Sharpe, Schwartz, Albert, D. Green, Barro

Relationship of federal courts to Congress and to the states, through analysis of cases dealing with federal judicial functions (including prob

lems of advisory opinions, standing to litigate, justiciability), federal questions in federal courts, federal review of state court decisions (including relation between state and federal substantive law, procedural problems in exercising review, application of law to fact). Sharpe, Albert—(Examination); Green—(Problem Assignments) (Fall—day and evening)

334 **Advanced Criminal Procedure** (2) Starrs, Robinson, Ferster

Decision to arrest, prosecutive discretion, bail, the preliminary hearing, right to a speedy trial, discovery, plea bargaining, publicity, post-conviction procedures. Starrs—(Examination and Problem Assignments); Robinson, Ferster—(Examination) (Fall—day and evening)

335 **Jurisprudence** (2) Mayo, Kramer

Basic jurisprudential concepts; nature of law; development of legal institutions; jurisprudential schools—natural law, analytical, historical, sociological, functional; law and logic; law and justice; the judicial process; legislative, executive, administrative decision-making; impact of politics, economics, and scientific advance on legal systems; contemporary trends in jurisprudential thought. Mayo—(Examination); Kramer—(Writing Assignments) (Fall—evening; spring—day)

336 **Taxation—Federal Income** (3) Weaver, Hambrick, Speiller

Survey of substantive provisions of federal income tax law, including concept of gross income, provisions affecting taxation of family and individual transactions, limitations on allowable deductions, sales and dispositions of property, problems of capital gains taxation, nontaxable exchanges. Weaver—(Examination and Problem Assignments); Hambrick—(Examination) (Fall—day and evening; summer 1973)

338 **Taxation—Federal Estate and Gift** (2) Kramer, Hambrick

Survey of substantive provisions of federal estate and gift tax laws, including inter vivos transfers, transfers in contemplation of death, joint interests, life insurance proceeds, property subject to powers of appointment, marital deduction and split gifts; tax procedure. (Examination) (Fall—day and evening)

339 **Collective Bargaining and Labor Arbitration** (3) Merrifield, Rothschild

Collective labor agreement: content, negotiation, administration through grievance procedure and arbitration; problems in settlement of labor disputes. Merrifield—(Examination and Problem Assignments); Rothschild—(Problem Assignments) (Spring—day and evening)

340 **Taxation—Federal Income, Corporations and Shareholders** (3) Hambrick, Tannenwald, Tucker

Continuation of Law 336. Primary emphasis on corporate-shareholder relationships. Problems of corporate dividends, redemptions of stock, distributions in partial and complete liquidation, stock dividends, bail-outs, and dividends in kind closely analyzed. Federal income tax problems involved in the formation of corporations, the sale of corporate businesses (including collapsible corporations), mergers and acquisitions, and corporate divisions. Students who have received credit for former Law 337 cannot receive credit for Law 340. Prerequisite: Law 336. (Examination) (Fall—evening; spring—day)

341 **Labor Law** (3) Merrifield, Albert, Rothschild

Law governing labor-management relations, organizations and representation of employees, regulation of economic weapons, enforcement of collective bargaining agreements, interunion and intra-union relations. (Examination) (Fall—day and evening; summer 1973)

Staff

342 **Moot Court** (1 or 2)

Limited to the winners of the upperclass competition in the fall and the first-year competition winners in the spring. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring)

Staff

343 **Law Students Civil Rights Research Council (LSCRRC)** (1 or 2)

Clinical projects concerned with the legal problems of civil rights. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—as arranged)

Staff

344 **Legal Writing** (1 or 2)

Preparation of a research paper under the supervision of a full-time member of the Faculty who will determine, prior to registration, whether the work required for the topic selected justifies one or two semester hours of credit. If elected for one hour of credit, this course may be repeated to meet the legal writing requirement for the degree. Approval of the faculty member is required prior to registration. (Research Paper) (Fall and spring—as arranged; summer 1973)

Staff

345 **Students-in-Court** (3)

Open only to third-year law students. In the D.C. Law Students in Court Program, students represent indigent litigents in the Small Claims, Landlord-Tenant, and Criminal (misdemeanors) division of the D.C. Superior Court. Their duties include client interviews, investigation, settlement negotiations, preparation and argument of motions, and conduct of trials. Students are required to spend one day in court and attend seminars each week (Wednesday or Thursday evening at the student's option in the civil program; Monday evening and Saturday morning in the criminal program). Some seminars will be held off campus. Application must be made during the spring semester of the preceding academic year; preference will be given to students with a cumulative-grade average above 75; however, consideration is given to past participation in clinical or extracurricular activities or employment which provides background for litigation and working with indigents. Students may participate during the summer, during the full academic year, or during the summer plus one other semester. This course may not be taken at the same time as Law 487, 579, or any litigating activities in Law 346. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—as arranged; summer 1973)

Staff

346 **Legal Aid** (arr.)

(Formerly Credit Activities (1 or 2))

Work done in connection with the Legal Aid Bureau under the supervision of the faculty adviser, who will determine, prior to registration, the number of semester hours of credit the work required will justify and whether the student has all prerequisites. Any litigating activities of this course may not be taken at the same time as Law 345, 487, or 579. The

grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—as arranged)

347 **Insurance** (2) Schiller, Pock

A primary risk distributing medium and the rules by which legislative, administrative, judicial bodies seek to promote its benefits and avert its dangers. Includes insurance marketing, insurable interest, subrogation, transfer of insurance benefits to nonpolicyholders, coverage and other insurance policy provisions, disposition of claims. (Examination) (Fall—day and evening; summer 1973)

348 **Domestic Relations** (2) Kayton, Seidelson, Potts, Ferster

Marriage, annulment, and divorce; adoption and custody of children; economic relations. Seidelson, Potts—(Examination); Ferster—(Problem Assignments); Kayton—(Examination, Research Paper, and extensive interdisciplinary readings) (Fall—day and evening; spring—day; summer 1973)

349 **Local Government Law** (2) Pinsky, Botein

Decision-making processes in metropolitan and local communities; types and objectives of city, county, special-function local government units; intergovernmental relations; original organization and changes; personnel; local lawmaking; responsibility in tort; introduction to community planning. (Examination) (Spring—evening)

351 **Law and Accounting** (2) Cibinic, Ginsburg

Study of fundamental accounting principles with emphasis on corporation accounting; legal and accounting implications of specific items in financial statements of corporations; inventory adjustments; corporate transactions, distributions, capital adjustments. Strongly recommended for students who have had no accounting. (Examination and Problem Assignments) (Spring—day and evening)

355 **Government Contracts** (3) Nash, Cibinic

Survey of basic law underlying government procurement, basic power and limitations on federal government in entering into contracts, administrative and legislative policies governing these contracts, advertised and negotiated procurement procedures, forms of contracts and clauses used. Law 431 *Government Procurement Law* is the substantial equivalent of this course. (Examination and Problem Assignments) (Spring—day)

359 **Patent Law** (3) Kayton, Harris

Law of patents subsequent to issuance of patent; nature of patent as property and as a legal instrument; validity—novelty, nonobviousness, commercial success; infringement—direct and contributory, doctrine of equivalents and file-wrapper estoppel. Substantive concepts introduced in an order approximating patentee's and infringer's cases in litigation. Designed for students intending to specialize in patent law; knowledge or experience in patent law helpful but not prerequisite. (Examination) (Fall—evening; spring—day)

362 **Patent Office Practice** (2) Kayton, Harris

Substantive and procedural law of patents leading to issuance of patent, mainly related to proceedings before U.S. Patent Office. Obtaining and preserving earliest possible patent filing date; continuing applications, res

judicata, novelty and nonobviousness requirements; substantive rules of priority of invention and related affidavit practice; nature of claims and formal defects; restriction and double patenting. Designed for students intending to specialize in patent law. Prerequisite: Law 359. (Examination) (Spring—evening)

372 **Administrative Law** (3) Miller, Park, Banzhaf

Study of the administrative process in executive and independent regulatory agencies; emphasis on judicial review. Formal and informal decision-making, investigation, planning, and public administration functions of the agencies as related to their legal limits and to the roles of lawyers in government and private practice. Relationships of agencies to the executive and legislative branches, to public and private interest groups, and to the social, political, and economic aspects of various philosophies of government regulation. Miller—(Research Paper); Park—(Examination and Writing Assignments); Banzhaf—(Examination) (Fall—day; spring—evening; summer 1973)

375 **Remedies** (3) Cibinic, Ginsburg, D. Green

Development and use of judicial remedies that give relief for past or threatened injuries to interests of personalty and property. Remedial approaches include compensatory and punitive damages, injunctions, unjust enrichment, constructive trusts, equitable liens, tracing, subrogation, and specific reparation. Emphasis on comparing remedial options in fraud, mistake, duress, breach of contract, and abuse of fiduciary relationships. Cibinic, Ginsburg—(Examination); Green—(Problem Assignments) (Spring—day and evening)

377 **Legislation** (2) Ferster, Lee

Legislative process and roles of participants in the process; operation of United States Congress and state legislatures, including fact finding, organization, procedure. Statutory interpretation emphasized to provide foundation for more advanced courses. (Examination) (Fall—evening; spring—day)

380 **Environmental Law I** (3) Reitze

Government control of environmental pollution; the National Environmental Policy Act; solid waste management; noise, water, and air pollution control; and common law remedies. (Examination) (Fall—day)

381 **Environmental Law II** (3) Reitze

Survey of the law of environmental planning, including selected topics of land use planning, mining, forestry, energy, transportation, public land law, and ocean protection. (Examination) (Fall—evening; spring—day)

385 **Trial Practice Court** (2) Jackson, Ryan, Kendrick, Skinker, Stevas, Altshuler, Nunzio, McArdle, Seidel

Trial of assigned cases, trial tactics and techniques, pre-trial and courtroom procedures pursuant to federal rules. Students may repeat this course once for credit. Prerequisite: forty-two semester hours, including Law 218. Prerequisite or concurrent registration: Law 232. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and Spring—day and evening)

388 **Appellate Practice and Procedure** (2)

Students participate in preparing an actual criminal case on appeal, starting with review of trial transcript and culminating with preparation of brief and oral argument before U.S. Court of Appeals for the District of Columbia Circuit or the U.S. Supreme Court. Appellate practice and procedure studied through texts; consultation with appellate judges, law clerks, and attorneys with cases pending on appeal; observation of arguments in the Supreme Court and the Court of Appeals. Admission by permission of instructor. (Research Paper)

389 **Medicine for Lawyers** (2)

Basic rudiments of medicine as encountered in a malpractice suit, divorce case, et. al., including medical terminology which will enable the lawyer to communicate more effectively with medical specialists. (Examination and Writing Assignments)

390 **Forensic Medicine** (2) Sharpe, Head

A survey of interprofessional relations between physicians and lawyers in the office, the hospital, and the courtroom, with incidental attention to laboratories, legislatures, and administrative agencies. Undergraduate law students and second-year medical students study how their professions accommodate conflicts between economics and ideals, and how they exercise judgment in applying their technical skills. (Examination) (Fall—day and evening)

394 **Women and the Law** (2) Gates, Bloomfield, Wolf

An examination of the treatment of women in all areas of the law and of legal remedies for sex discrimination. Emphasis on constitutional law, criminal law, discrimination in the media, education, and employment. Students choose clinical projects or research papers on which to focus the semester's work. Enrollment limited to 30 students. (Research Paper) (Fall and spring—evening)

395 **Public Participation Strategies: Tax Policy** (2) Stanton

Study of the development of legal strategies with the administrative and legislative processes; emphasis on the formulation of tax policy. Specific cases will be studied for analysis of potential alternative strategies for constructively affecting the decision process. Two-thirds of the course will be devoted to the study of past cases, the last third to the formulation of strategies to influence pending decisions. Open to a limited number of third-year students. The final grade will be based upon class participation and the quality of strategy formulated to deal with a specific problem selected by the student with the approval of the instructor. (Writing Assignments) (Fall—day)

396 **Legal Activism** (3) Banzhaf

Study of the use of law and the legal process, not as a technique for resolving disputes between identified individuals and/or organizations, but as a powerful tool for ameliorating problems of general public interest. Principles and techniques of legal activism, maximum effectiveness of public interest actions, how these actions differ from conventional legal practice. To learn these techniques effectively, and to test and develop their proficiency in their use, students will form clinical project groups and initiate or participate in a legal or law-related activity directed against a public interest problem of their own choosing. (Fall—day)

399 **Clinical Law Work** (arr.)

Projects involving litigation, research, or public interest activities of a legal nature (including aid to indigents, support of public interest non-profit corporations, and support of governmental agencies or courts) may be initiated and will be supervised by a faculty member. Projects must be approved in advance by the Law Center Supervisory Committee (three members) both as to whether the project is appropriate and as to the number of semester hours of credit to be granted. A maximum of four semester hours of credit may be taken in one or two semesters. This course is open to a limited number of third-year law students. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring)

ADVANCED COURSES

ADMINISTRATIVE LAW: ECONOMIC REGULATION

Faculty Advisers: A.S. Miller, R.E. Park, G.E. Weston

402 **Executive Function** (2)

Executive branch in constitutional theory; major trends in development of executive-administrative function; organization of executive branch; relationship of executive to Congress and judiciary; policy-making procedures within executive branch including role of Bureau of the Budget in national policy planning; case studies in exercise of executive power in such functional areas as national defense, race relations, national economy, foreign economic relations; role of law and lawyers in executive decisional and implemental process. (Research Paper) (Fall—day)

403 **Public Economic Policy and the Law** (2)

Interrelation of law and economics in such subject-matter categories and decisional contexts as economic regulation of industry, fiscal policy planning, government research and development practices, foreign trade and investment, and public spending priorities. (Research Paper) (Fall—evening)

404 **Securities Regulation** (2) H. Green, M. Cohen, Mathews, Michael

State and federal laws governing offering and distribution of securities to the public by corporate issuers and others, regulation of securities markets, rights and liabilities of purchasers under such statutes. Emphasis on statutes administered by Securities and Exchange Commission. (Take-home Examination) (Fall—evening; spring—day)

405 **Regulation of Securities Markets** (2) Rotberg, Eisenberg

Operation of over-the-counter and exchange markets, including competitive and monopolistic practices in each market; relationship of antitrust laws and securities regulations to concept of a free and open market place; role of regional exchanges and third market in providing competitive element in market; advantages and disadvantages of a fragmented market; minimum fee structure, rebates and their effect on merchandising of securities and financial soundness of industry; use and availability of economic data in evaluating performance of market place. The seminar will examine matters directly of interest to graduate law students, lawyers, economists, and political scientists. (Take-home Examination) (Spring—evening)

407 **Seminar: Regulation of Transportation I** (2) Hill

History of development of modes of transportation in the United States; economic problems and growth of regulatory legislation and philosophy; the congressional power to regulate; the scope of federal regulation; division of regulatory authority between federal and state governments; introduction to principles of certification and rate-making. (Examination) (Fall—evening)

408 **Seminar: Regulation of Transportation II** (2) Hill

Principles of certification of rail, motor, water, and air carriers; elements and principles of rate-making; comparison of problems, procedures, and regulatory philosophies of the various regulatory agencies. (Examination) (Spring—evening)

412 **Food and Drug Law** (2) Goodrich, Kaplan, Kleinfeld

The Federal Food, Drug, and Cosmetic Act, and related laws. Consumer, government, and industry viewpoints. (Choice of Paper or Examination) (Spring—evening)

413 **Public Policy and Mass Media** (2) Barron, Cohn

Institutional structure of mass media and their interrelationships; psychological aspects of mass communications; continuing adjustments among public interest goals, the economic system, and technological developments; influence of and controls exercised by government, other institutions, and private groups; conflict between freedom of speech of the media and other major community interests; the media's relationships to the interests of dissident and minority groups and the access of these groups to the media. Cohn—(Research Paper) (Fall—day; spring—evening)

414 **Regulated Industries** (2) Park

Substantive problems of business regulation in terms of natural monopolies, licensed industries, subsidized industries, and safety regulation. Typical problems raised include the role of intervenors, the impact of regulation upon management and market behavior, the uses and abuses of economic evidence, the role of agencies' staffs, interagency planning and regulation, and the effects of judicial and legislative review. Each student selects one industry and develops his insight into economic regulation in terms of that industry's firms, market structure, growth and development, trade associations, and regulatory agencies. (Research Paper)

417 **Seminar: Trade Regulation** (2) Weston, Harris

Group study of current problems relating to unfair trade practices and federal antitrust laws. (Research Paper) (Fall and spring—evening)

Master of Laws candidates in the area of Administrative Law: Economic Regulation who have not taken the following courses or their equivalent as part of Juris Doctor or Bachelor of Laws program should include them in their Master's program.

329 *Unfair Trade Practices*
330 *Federal Antitrust Laws*
372 *Administrative Law*

OTHER RELATED COURSES

451 *Federal Programs in Urban Poverty*
493 *Intergovernmental Aspects of Technological Change*
494 *Use and Control of Atomic Energy and Space Technology*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
571 *Land Development Planning*
594 *Seminar: Privacy*

CORPORATION LAW

Faculty Advisers: H.P. Green, R.B. Stevenson, Jr.

422 **The Modern Corporation** (2)

Analysis of the nature and role of the large business corporation in the American political economy; models of the corporation; the transnational or multinational enterprise; the concept of accountability as applied to corporate activities; reasons for the growth of large corporate enterprise; relationships of the "supercorporations" to other centers of decentralized power and to the government; the corporation as the basic planning unit of the American economy; application of the Constitution to the corporation. (Research Paper)

424 **Business Planning** (2) H. Green, Stevenson, S. Cohen, Seigel, Tucker, Flyer, Lowe

Integrated study of corporate, financial, tax, accounting, and SEC aspects of the following: organization of a small corporation; organization of a public corporation; stock dividends, recapitalization, and stock repurchases in the context of conflict between active stockholders of a close corporation and the family of a deceased active stockholder, corporate liquidations; corporate mergers and acquisitions; and divisions of corporations. Prerequisite: Law 312, 336, and 340. Enrollment may be limited. Green, Stevenson—(Problem Assignments); Cohen, Seigel—(Writing Assignments) (Fall and spring—day and evening; summer 1973)

427 **Legal Aspects of International Business Transactions** (2) Nurick, Guttentag, Stevens

U.S. law and practice, including current tax problems and U.S. restrictions on investment; brief comparison with British and civil law systems; international law, international contracts, choice of law; currency considerations; effect of SEC laws and regulations; international trade, including GATT and reciprocal trade arrangements; sources of finance, both United States and foreign, private and public, including international organizations; protection of property, settlement of disputes, and selected current studies. In addition to the regular lecturers, there will be guest lecturers in various specialties. Emphasis on current problems in international trade and investment. (Choice of Paper or Examination) (Spring—day and evening)

Master of Laws candidates in the area of Corporation Law who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

312 *Corporations*
313 *Sales and Sales Financing*
329 *Unfair Trade Practices*
330 *Federal Antitrust Laws*
340 *Taxation—Federal Income, Corporations and Shareholders*

OTHER RELATED COURSES

331 *Product Liability*
417 *Seminar: Trade Regulation*
431 *Government Procurement Law*
525 *Copyright Law*
526 *U.S. and International Trademark Practice*
540 *Comparative Conflict of Laws and Transnational Legal Problems*
541 *Seminar: European Common Market*
555 *Taxation—Special Corporation Problems*
562 *Income Taxation of Foreign Business and Investment*

GOVERNMENT PROCUREMENT LAW

Faculty Advisers: J. Cibinic, Jr., G.J. Ginsburg, R.C. Nash, Jr.

431 **Government Procurement Law** (3) Nash, Cibinic

Survey of the law pertaining to government procurement, including an analysis of the unique features of government contracting and a discussion of the functions of Congress, the executive branch, and the courts in the procurement process. Law 355 *Government Contracts* is the substantial equivalent of this course. (Examination) (Fall—evening)

433 **Performance of Government Contracts** (3) Nash, Cibinic

Discussion of the substantive legal problems that most frequently arise during the performance of government contracts. Interpretation of specifications and the most generally used contract clauses, and analysis of the rights of the parties when performance in accordance with the terms of the contract is not obtained. (Examination and Problem Assignments) (Fall—evening)

434 **Government Contract Claims and Litigation** (2) Nash, Ginsburg

Analysis of the methods which can be used by the parties to a government contract to obtain legal relief, including detailed coverage of the disputes procedure, actions for breach of contract, and forms of equitable and extraordinary relief. (Examination and Problem Assignments) (Spring—evening)

435 **Seminar: Government Contracts** (2) Nash, Cibinic, Ginsburg

Research and discussion of selected problem areas. (Research Paper) (Spring—day)

OTHER RELATED COURSES

402 *Executive Function*
424 *Business Planning*
427 *Legal Aspects of International Business Transactions*

442 *Labor Standards and Equal Employment*
494 *Use and Control of Atomic Energy and Space Technology*
495 *Legal Protection against Technological Hazards*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
535 *Negotiation: Concepts and Techniques*

LABOR LAW

Faculty Advisers: J.M. Albert, L.S. Merrifield, D.P. Rothschild

441 **Seminar: Disability Problems** (2) Doherty
Workman's compensation law, extension of no-fault principle into motor vehicle area, and national health problems. (Examination) (Fall—evening)

442 **Labor Standards and Equal Employment** (2) Ginsburg, Margolin
Analysis of the Fair Labor Standards Act, its scope and exemptions, the Civil Rights Act and other labor statutes; the laws establishing labor standards for government contracts, including the Davis-Bacon Act, Walsh-Healey Act, Service Contract Act, and Work Hours Act; the role of the Department of Labor, the Comptroller General, and the contracting agencies in interpretation, administration, and enforcement of these statutes. (Examination) (Spring—evening)

443 **Labor Relations in the Federal Service** (2) Tobias
Survey of labor relations in the federal service as governed by Executive Order 11491. Emphasis on the role of the Civil Service Commission, the Department of Labor, the Congress, and the President in the development of collective bargaining relationships between unions and the federal government. (Research Paper) (Fall—evening)

444 **The Individual and His Union** (2) Gold
Study of the legal relations between unions and their members with special emphasis on the right to fair representation, the right to union membership, compulsory union membership, the imposition of discipline upon union members, reporting requirements, the conduct of internal union elections, the fiduciary duties of union officers, the imposition of trusteeships, the regulation of racketeering, and political action of unions. Prerequisite: Law 341. (Examination) (Summer 1973)

445 **Labor Relations in State and Local Governments** (2) Jascourt
Analysis of the shifting and emerging legal concepts that affect the form, scope, and consequences of labor relations in schools and colleges and in municipal, county, and state governmental bodies. Survey of the varied statutory and de facto labor relations systems and their impact on the development of bilateral decision-making. Examination of (1) problems caused by the concurrent existence of civil service laws and the diffusion of governmental authority, (2) impasse resolution, and (3) strikes and other concerted activities. (Problem Assignments) Merrifield

447 **Seminar: Labor Law** (2)
Group study of contemporary problems in labor law. (Research Paper) (Spring—day)

449–50 **Seminar: Labor Litigation** (1–1) Gold

Intensive study of recent Supreme Court and appellate court decisions in the area of labor law; special emphasis on the contrasting variables which influence the respective decision-making processes of the National Labor Relations Board and the courts. Particular attention to labor law cases pending before the Supreme Court for decision during the current term. Analyses of the briefs filed in pending cases; attendance at oral argument; post mortems of the arguments and decisions, with classroom participation by attorneys involved in some cases. Grades and credit for both halves of the course assigned only on completion of the second half. Enrollment may be limited. Prerequisite: Law 341. (Research Paper) (Academic year: every other week—evening)

Master of Laws candidates in the area of Labor Law who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

339 *Collective Bargaining and Labor Arbitration*
341 *Labor Law*

OTHER RELATED COURSES

459 *Problems of the Consumer*
460 *Current Problems in Civil Rights*

LAW AND POVERTY

Faculty Advisers: R.S. Kuhn, D.P. Rothschild, J.E. Starrs

451 **Federal Programs in Urban Poverty** (2) Mirel

Students are given a chance to observe at first hand the problems inherent in implementing a federal policy to alleviate poverty through legislation. Students are assigned to work with individual poverty agencies in the District of Columbia on matters relating to the federal funding agencies. Discussions focus on various aspects of poverty law problems as lawyers deal with them—from conception of the legislative program, to Congressional debate, to administrative policies, to fund distribution, to litigation. (Research Paper) (Fall—day)

458 **Housing the Poor** (2) Starrs

An in-depth analysis of current housing problems, including three main subjects: (1) Discrimination in housing. (2) Landlord and tenant relationship, including a discussion of leases and their clauses and of the eviction process, tactical and substantive defenses to it, and affirmative avenues of redress on behalf of the tenant; public housing and building code enforcement. (3) Home ownership by the poor, including its financing by instruments such as the deed of trust and the installment land contract as well as federal subsidy programs. Admission by permission of instructor. (Research Paper) (Spring—day)

459 **Problems of the Consumer** (2 or 3) Rothschild, Schwartz

Clinical treatment of consumer protection. No regular classes; minimum of 5 hours commitment each week required. Students purchase materials on consumer protection and are divided into project groups for the purpose of indicating the problems of the consumer to the community by a

campaign of consumer awareness. For example, the National Law Center has negotiated with a commercial TV station to put on a series of "spots" dramatizing these problems, and will also run a "Consumer Help Center." This activity will involve three groups: (1) a group to work with the station on programming, (2) a group to run the Consumer Help Center, and (3) a research group to investigate the results of turning complaints over to the appropriate authority. Another student project will dramatize problems of the consumer by teaching consumer awareness in the public school system in the District of Columbia. Other projects are also available. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—day; summer 1973) Kuhn

460 **Current Problems in Civil Rights** (2)

Uses of law in the effort to achieve racial equality, in areas such as (1) discrimination against minority groups and the poor in land use and zoning, (2) school desegregation, and (3) employment discrimination. The class is divided into groups, each dealing with a problem situation in one of these areas. Students represent fictitious clients, write briefs, and argue in class before a student panel of judges, which then writes an opinion. Grades are based on these written and oral presentations, plus brief critiques of other groups' presentations. (Problem Assignments) (Spring—day)

OTHER RELATED COURSES

441 *Seminar: Disability Problems*
472 *Administration of Criminal Justice*
475 *Law and Criminology I: Search for the Causes of Criminal Behavior*
476 *Law and Criminology II: Society's Responses to the Criminal Offender*
477 *The Police and the Community*
560 *Taxation—State and Local*
571 *Land Development Planning*
575 *Community Economic Development*
590 *Population Control and the Law*
592 *Seminar: Constitutional Law*

LAW, PSYCHIATRY, AND CRIMINOLOGY

Faculty Advisers: R.C. Allen, T.F. Courtless, Jr., E. Ferster Allen

472 **Administration of Criminal Justice** (2)

Consideration and analysis of selected advanced problems in the administration of criminal justice. The subject matter covered will vary from year to year, with concentration in areas of current interest and dynamic change (e.g., right to counsel, arrest and interrogation, search and seizure, prejudicial publicity, discovery, electronic interception, mental impairment). Emphasis will be placed on the role and professional responsibilities of prosecutor and defense counsel and on developmental trends in the law. (Research Paper or Examination) Starrs

473 **The Crime Lab, the Forensic Scientist, and the Criminal Lawyer** (2)

Designed to acquaint the student with the operations of a modern crime laboratory and the courtroom acceptability of testimony of forensic scien-

tists and other evidence on laboratory test results. Identification of individuals (fingerprints, palmprints, footprints, voiceprints, anthropological reconstruction, hair identification, and serology), identification of objects (ballistics, handwriting, typewriting, fiber identification, paints, varnishes, glass, wood, and paper), toxicology, pathology, forensic use of the microscope and the camera, the coroner and the medical examiner systems, and drug law enforcement. Visual aids, crime laboratory guest lecturers, and field trips to crime laboratories. (Research Paper)

475 **Law and Criminology I: Search for the Causes of Criminal Behavior** (2) Courtless

Role which criminological knowledge of crime causation may play in assisting lawyers to appraise the effectiveness of various alternative social and legal devices in controlling deviant behavior. The search for factors related to criminal behavior will be developed historically, with emphasis on current causal theories developed by various disciplines. Model as well as operational penal codes, sentencing and probation practices, and specialized facilities will be analyzed in terms of their relationship to such casual theories. (Research Paper) (Fall—day)

476 **Law and Criminology II: Society's Responses to the Criminal Offender** (2) Courtless

Study of the development and current use of society's three major approaches to the handling of offenders: punitive, mechanical, and correctional. Emphasis on society's changing responses to criminal and delinquent behavior, and research findings concerning effectiveness of these responses. Analysis of treatment strategies to facilitate communication between members of the legal profession and behavior scientists charged with effectuating these strategies. Prerequisite: Law 475. (Research Paper) (Spring—day)

477 **The Police and the Community** (2) Allen, Courtless

Problems and potential of contemporary urban law enforcement: the role and perspective of the police officer; the police *qua* organization; "styles" of law enforcement; law enforcement in the inner city; relationship with ethnic minorities; civil disorder; police-community relations; methods in arrest and investigation; complaint review procedures; science and technology in law enforcement; police handling of juveniles; crime and crime statistics. (Problem Assignments) (Spring—day)

478 **Post-conviction Dispositions** (2)

(*Formerly Post-conviction Dispositions—Dynamics of the Law of Criminal Corrections*)

Study of the practice, problems, and alternatives facing a defendant, and discussion of the goals and standards for the criminal justice system. Enrollment limited to 25 students. Students who receive credit for Law 478 cannot receive credit for Law 480. (Examination) (Spring—day)

479 **Seminar: Criminal Practice** (2) Perazich, Schaffer

For students who expect to be involved in the trial of criminal causes. Weekly classroom sessions with emphasis on clinical training; students will be assigned to attorneys drawn from the private bar in the District of Columbia as well as from the Public Defender Service, who are actively engaged in the trial of criminal matters. Students serve as investigators,

research assistants, and perhaps as co-counsel during the preparation and trial of criminal cases. Active participation in all stages of the criminal litigation including client and witness interviews, plea bargaining, bail proceedings, pretrial motions, and the trial itself. Enrollment limited to 20 third-year or graduate students. Prerequisite: Law 334. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—day)

Barkai

480 **Dynamics of the Law of Criminal Corrections** (2)

Study of the statutes and potential problems facing a defendant, including mental fitness to proceed to trial, probation, sentencing, parole, correctional institutions, rights of prisoners. Enrollment limited to 25 students. Students who receive credit for Law 480 cannot receive credit for Law 478. (Examination) (Fall—evening)

Sharpe, Cotton

485 **Seminar: Health Care Delivery Systems** (2)

Study of the role of the lawyer in existing and proposed national systems for delivering health care. Students will gain familiarity with the concepts and terms in health care delivery by working with issues in the design, finance, and administration of existing arrangements; examination of the means of reconciling the expectations of various groups of health care service consumers and providers. (Research Paper) (Spring—evening)

Allen

486 **Seminar: Law and Psychiatry** (2)

Designed to (1) expose the lawyer to some of the constructs of dynamic psychiatry dealing with human personality and behavior, and to relate them to problems encountered in legal practice; (2) provide information —both psychiatric and legal—bearing upon such topics as mental illness and tort liability ("traumatic neurosis," malpractice, commission of torts by mentally ill persons); hospitalization of the mentally ill and mentally retarded; guardianship; ad hoc determinations of incompetency (testamentary, contractual, and donative capacity; capacity to marry, have custody of children; mental illness as a ground for divorce; eugenic sterilization); mental illness and the criminal law (psychiatric evaluations in criminal cases, determinations of competency to stand trial, criminal responsibility); and (3) examine the role of psychiatry in legal settings, including the effective use of the psychiatrist and psychologist as expert witness. (Research Paper) (Fall—day; summer 1973)

Forster

487 **Interdisciplinary Seminar on the Juvenile Court** (3)

Clinical program in juvenile law. Enrollment limited to 10 third-year students or Master of Laws candidates. Admission by permission of instructor. This course may not be taken at the same time as Law 345, 579, or any litigating activities in Law 346. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Problem Assignments) (Fall and spring—day)

OTHER RELATED COURSES

390 *Forensic Medicine*
591 *Legislative Drafting*
592 *Seminar: Constitutional Law*

LAW, SCIENCE, AND TECHNOLOGY

Faculty Adviser: H.P. Green

491 **Science Policy Formulation** (2) Anderson

Recent and forthcoming important governmental decisions in science and technology; the role of law as a science policy implement; law in the decision-making process; risk-benefit decisions by Congress, the administrative process and the courts; bringing health, safety, environment, and aesthetics into technology assessment. (Research Paper) (Fall—evening)

492 **Seminar: Science and the Legal Process** (2) H. Green

Reciprocal relationships between law and science; absorption of scientific concepts into substantive law through adjudication, legislation, and rule-making; techniques and procedures used in handling, developing, and deciding scientific issues. (Research Paper) (Fall—evening)

493 **Intergovernmental Aspects of Technological Change** (2)

Role of technology in breaking down political barriers and leading to intergovernmental measures to control or advance technological progress within the United States and on an international basis. Specific legal devices and institutions employed in intergovernmental handling of technological problems. (Research Paper)

494 **Use and Control of Atomic Energy and Space Technology** (2) H. Green

Problems resulting from revolutionary scientific developments of recent years. Impact of advanced technologies on the law and legal institutions. Laws and regulations relating to atomic energy and space including civilian uses, licensing, security, international, and patent considerations. (Research Paper) (Spring—evening)

495 **Legal Protection against Technological Hazards** (2) Dembling, Brown

The growth and development of law and legal institutions to protect society against the hazards inherent in new technologies with particular emphasis on the progress of reconciling the protection of the public with the desire for rapid progress. (Research Paper)

OTHER RELATED COURSES

380 *Environmental Law I*
381 *Environmental Law II*
402 *Executive Function*
412 *Food and Drug Law*
413 *Public Policy and Mass Media*
431 *Government Procurement Law*
503 *Natural Resources Law and Policy*
505 *Intergovernmental Relations I*
531 *International Law of Air and Space*
532 *International Law of the Sea*

NATURAL RESOURCES LAW AND ENVIRONMENTAL LAW

Faculty Advisers: J.M. Brown, A.W. Reitze

Brown

501 **Land Development Law** (3)

Study of the various techniques relative to land development; the status of the federal government as landlord, vendor, and purchaser; the competitive private market as a form of planning in comparison to governmental planning programs; the functions of the lawyer in the modern real estate transaction involving land acquisition, licenses, codes and permits, development, construction, sale, and financing. Consideration of new forms and concepts of ownership, transportation programs as a part of land development planning, the migration of people and industry as a planning and control factor, and private and public "new town" developments. (Examination) (Fall—day; summer 1973)

502 **Water Resources Law** (3)

Introductory survey course in the law relating to water resources. History and development of water rights systems in the United States using a comparative analysis of Eastern and Western water law doctrines, the trends toward their modification, and study of the increasing influence of federal laws and projects. Consideration of private and public rights to both consumptive and nonconsumptive uses; analysis of pollution and other water quality problems and their interrelationships with the total demand for water and other natural resources. Identification of federal-state-local relationships, conflicts, and institutions; consideration of river-basin management and interbasin transfers; description of proposed creation of new sources. (Examination)

Kratchman

503 **Natural Resources Law and Policy** (2)

Study of key legal doctrines and their development in the law of water, mining, and oil. Systematic analysis of natural resource problems such as government and private interactions, multiple use and priorities of resources, and security of property rights. Examination of alternatives in resource policy development, and impact on private and public actions. (Research Paper) (Spring—evening)

Nash

505 **Intergovernmental Relations I** (2)

Study of federalism, emphasizing current techniques for achieving cooperation and coordination between federal, state, and local governments. Detailed consideration of devices used, including interstate compacts, grants-in-aid, and exercise of regulatory powers. (Writing Assignments) (Fall—day)

Nash

506 **Intergovernmental Relations II** (2)

Advanced seminar on multi-government activities and current topics on intergovernmental relations. (Research Paper) (Spring—day)

B. Cohen

508 **Environmental Litigation** (2)

Special problems of environmental lawsuits. Topics include pleadings, procedural problems, selection of the proper court, problems of proof, remedies, selection of parties, discovery techniques and trial preparation, and the use of expert witnesses and scientific evidence. Prerequisite: Law 380 or graduate status. Enrollment limited to 30 students. (Choice of Research Paper or Clinical Work) (Spring—evening)

509 **Clinical Studies in Environmental Law** (2 or 3 or 4) Reitze

The student works on a project in the environmental law field under the supervision of both the faculty director of the program and a lawyer practicing environmental law. The project may involve working with a government agency, a congressional committee, a private practitioner, or a nonprofit public-interest environmental organization. The aim of the course is to have the student produce a serious piece of professional work under close supervision. Admission to this course requires second-semester second-year, third-year, or graduate standing and permission of the Director of the Environmental Law Program. Students who have mastered the fundamentals of environmental law are selected for this course. Normally this will require completion of at least Law 380. In addition, consideration will be based on the other environmentally related courses taken including those in Natural Resources Law and in Law, Science, and Technology, as well as work experience and other demonstrated interest in environmental law. Students may repeat this course for a maximum of 8 semester hours of credit. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—day)

r of Laws candidates in the area of Natural Resources Law and Environ-l Law who have not taken the following courses or their equivalent as f a Juris Doctor or Bachelor of Laws program should include them in Master's program.

380 *Environmental Law I*
381 *Environmental Law II*

R RELATED COURSES

349 *Local Government Law*
403 *Public Economic Policy and the Law*
431 *Government Procurement Law*
491 *Science Policy Formulation*
492 *Seminar: Science and the Legal Process*
495 *Legal Protection against Technological Hazards*
532 *International Law of the Sea*
560 *Taxation—State and Local*
571 *Land Development Planning*
590 *Population Control and the Law*
591 *Legislative Drafting*

NT AND TRADE REGULATION LAW

y Advisers: L.J. Harris, I. Kayton, G.E. Weston

521 **International and Comparative Patent Law** (2)

Origin of patent laws. Patent systems of major countries—United Kingdom, France, Germany, USSR, and others. Comparative topical survey: kinds of patents, inventors and applicants, subject matter, novelty, administrative procedures, oppositions, revocation, renewal fees, compulsory licensing infringement, etc. International Convention for the Protection of Industrial Property: origin, membership, organization, substantive provisions. Treaties in the making, Common Market patent system, Nordic Patent, Patent Cooperation Treaty, Council of Europe activities. Pre-

requisite: Law 359 and 362, or former Law 360. (Take-home Examination) Finnegan

522 **Patent and Know-how Licensing** (2)

The business and legal criteria necessary to implement and maintain successful licensing programs; emphasis on the strategy and techniques that permit a proprietor of intellectual property to effectively exploit his status as the owner of a unique form of property. Subject areas covered are business objectives in licensing; legal outline of licensing situations; rights and duties of license parties; factors in selecting which inventions to license—financial, legal, and commercial; finding and selecting the right licensees; determining and negotiating the terms and clauses of the contract; administering and enforcing the license; antitrust and misuse constraints on the business and law of licensing; tax factors affecting the patent and know-how contract; special problems in trade secret, know-how, and show-how contracts; international licensing. Prerequisite: Law 359 and 362, or former Law 360. (Choice of Paper or Examination) Dunner

523 **Court Review of Patent Office Decisions** (2)

Procedure and procedural law involved in appealing to the U.S. Court of Customs and Patent Appeals and the U.S. District Courts from administrative decisions in the U.S. Patent Office. Designed to provide an exhaustive step-by-step procedural progression through *ex parte* and *inter partes* patent and trademark appeals. Emphasis on the forms used in the many motions and proceedings before the U.S. Court of Customs and Patent Appeals and the District Courts required to perfect an appeal. Attendance at and critique of actual court proceedings. Introductory material includes administrative appeals before the U.S. Patent Office Board of Appeals. Prerequisite: Law 359 and 362, or former Law 360, or the equivalent in experience. (Examination) (Fall—evening) White

524 **Chemical Patent Practice** (2)

Seminar covering patent application preparation, prosecution, appeals and licensing which are peculiar to chemical patent practice. Prerequisite: Law 359 and 362, or former Law 360; or comparable experience in the practice of patent law. (Examination) (Fall—evening) Carr

525 **Copyright Law** (2)

Historical background; formalities and essentials in securing a copyright; subject matter of copyright; remedies; international aspects of copyright under Berne Union, Universal Copyright Convention, Inter-American Convention; copyright licensing and performing rights societies. (Examination) (Spring—evening) Office

526 **U.S. and International Trademark Practice** (2)

Registerability and enforcibility of trademarks and tradenames in the United States and in several foreign countries. Procedural and substantive law necessary to advise as to what names and marks are registerable in the United States and the detailed procedure to be followed before the U.S. Patent Office in obtaining federal registration. A comparative law approach with respect to procedures for registration in foreign countries. Legal considerations with respect to licensing trademarks and tradenames internationally. Prerequisite: Law 329. (Examination) Harris

527 **Advanced Topics in Patent Law** (2)

Multidisciplinary consideration in depth of current industrial-intellectual property problems; licensing and protection of industrial property; pa

and abuses of patents; governmental regulation; protection and transactions abroad; international treaties and arrangements; role of patents, trademarks, and trade secrets in business; economic and social functions of patents, trademarks, and copyrights. Students are exposed to pertinent source materials, professional research methods and techniques. Opportunity for oral presentation and discussion of term papers prior to submission is provided to encourage instructional dialogue among students and the investigation and analysis of issues. Prerequisite: Law 359 and 362, or former Law 360; or the equivalent in experience. (Research Paper) (Spring—evening)

529 **Research in Patent, Trademark, and Copyright Law** (2) Harris

Prerequisite: Law 417, 527, and related courses; and a *B* average. Request in writing, with proposed outline of topic of research, must be submitted to the Dean at least one month prior to registration day. Work must be completed within the semester and paper submitted not later than last day of classes. Graduate students may repeat this course once for credit with the approval of the Dean. (Research Paper) (Fall and spring)

ster of Laws candidates in the area of Patent and Trade Regulation Law who e not taken the following courses or their equivalent as part of a Juris Doc- or Bachelor of Laws program should include them in their Master's program.

329 *Unfair Trade Practices*
330 *Federal Antitrust Laws*
359 *Patent Law*
362 *Patent Office Practice*

ER RELATED COURSES

412 *Food and Drug Law*
417 *Seminar: Trade Regulation*
427 *Legal Aspects of International Business Transactions*
431 *Government Procurement Law*
491 *Science Policy Formulation*
492 *Seminar: Science and the Legal Process*
493 *Intergovernmental Aspects of Technological Change*
541 *Seminar: European Common Market*
562 *Income Taxation of Foreign Business and Investment*

RNATIONAL LAW AND COMPARATIVE LAW

ulty *Advisers:* International Law—W.T. Mallison; Comparative Law— . Albert

531 **International Law of Air and Space** (2) Dembling

Study of the development of international law relating to the use of air space and outer space; analysis of air and space treaties in force; the role of various intergovernmental and nongovernmental international organizations; consideration of special problems such as liability resulting from space activities, space technology and arms control, and pollution and contamination of outer space; earth resources, sensing, etc. (Research Paper) (Fall—evening)

Muy

532 International Law of the Sea (2)

International and domestic law affecting the allocation of authority over ocean space. Problems concerning internal waters, territorial seas, the high seas, contiguous zones, and the continental shelf; the impact of advances in ocean science technology on ocean resource law; freedom of the sea, maritime safety, and related subjects. (Research Paper) (Spring—evening)

Mallison

533 Legal Regulation of International Coercion (2)

Process of legal decision during war and at times when expectations of violence are high—contemporary international law of war and coercive measures short of war, such as limited naval blockade; legal aspects of modern methods of coercion—economic, political, psychological, and military; limited war and modes of preventing "escalation" to total war; regulation of hostilities including protection of war victims, civilian persons, and prisoners of war; war crimes and punishment; problems concerning weapons of mass destruction; and problems of transforming coercion situations to minimum order ones. (Research Paper) (Fall—day)

Ramundo

535 Negotiation: Concepts and Techniques (2)

Role of the lawyer and policy maker (client) in private, intragovernmental, and international negotiations; negotiations in private practice and governmental operations; achievement of consensus among contentious parties; negotiating techniques, including effective use of the "fallback"; gaming exercises in the actual conducting of negotiations, with practical work in the preparation of claim letters, agency and national positions, and negotiating instructions. (Writing Assignments) (Spring—evening; summer 1973)

Mitchell

536 Diplomatic and Consular Law and Practice (1)

Development of diplomatic and consular relations between nations; legal rights, privileges, functions, and immunities of diplomatic and consular personnel; extent of immunity from jurisdiction of foreign governments, missions and representatives; problems of taxation affecting foreign government missions and personnel. (Research Paper)

del Russo

537 The International Law of Human Rights (2)

Theory of fundamental freedoms from its philosophical to its legal formulation in the American and French Revolutions, the individual, vis-a-vis, the State, human rights as rights against the national government, the emerging of the individual in the law of nations as a subject of rights and duties, the individual as subject of international concern, social and political forces stressing the need for international recognition and protection of human rights, the setting of human rights standards. The Universal Declaration and its influence over the law of nations, critical assessment of the work of the UN in the human rights field, regional approach to the international protection of human rights, analysis of the case law of the European Convention, human rights in the Inter-American system, state sovereignty and the international protection of human rights, a comparative approach to human rights' protection at the national level, due process and freedom of speech in light of different legal systems. (Research Paper) (Spring—day)

540 **Comparative Conflict of Laws and Transnational Legal Problems** (2)

Adjudicatory jurisdiction, recognition and enforcement of foreign judgments in England and the Common Market countries; choice of forum clauses; transnational commercial arbitration; the Convention on the Settlement of Investment Disputes between States and Nationals of Other States; sovereign immunity; international judicial assistance; proof of foreign law; transnational contracts and stipulations of applicable law. Prerequisite: Law 309. (Research Paper)

541 **Seminar: European Common Market** (2) Belman

Analysis of treaty establishing European Economic Community; institutions of EEC and of member states and the internal law of member states as they affect doing business in EEC; series of problems arising out of establishing and operating business with and within EEC. Background in international law and antitrust law desirable. (Research Paper) (Fall—evening)

542 **Seminar: International Technical and Economic Assistance** (2)

Technical and economic assistance activities of the United States, the United Nations, and specialized agencies; problems of law, policy, program, and administration; development planning; public and private transactions and institutions involving technical or economic assistance. (Research Paper)

546 **Soviet Law** (2) Ramundo

Concept of "socialist legality"; legal relationship of individual to state and other participants in Soviet society; role of Party in Soviet legal system; Soviet philosophy of law; state (constitutional) law: Soviet federalism, governmental apparatus, rights and obligations of citizenship; criminal law; property law; labor law; selected topics in civil law and procedure; international law. (Choice of Paper or Examination) (Fall—evening)

547 **Chinese Law** (2) Hsia

Emphasis on the legal system of Communist China; analysis of the constitutional law of the People's Republic of China, including general principles, state structure, and rights and duties of citizens; a brief survey of the administration of justice—courts, procuratorates, and lawyers; marriage law; land law; counterrevolutionary act and other criminal statutes; principles of civil law; Communist Chinese concept of international law. (Research Paper) (Spring—evening)

548 **Law of the Near East** (2) Liebesny

Law of the Arab countries, Turkey, and Iran, including basic principles of Islamic law, analysis of the present day codes, and investigation of the Western influences on laws of these countries. (Examination)

...er of Laws candidates in the area of Public International and Comparative ... who have not taken the following courses or their equivalent as part of a ... Doctor or Bachelor of Laws program should include them in their Mas... program.

302 *Admiralty*

304 *United Nations Law and World Order*

305 *International Law and World Order*
307 *Comparative Law*
309 *Conflict of Laws*

OTHER RELATED COURSES

427 *Legal Aspects of International Business Transactions*
494 *Use and Control of Atomic Energy and Space Technology*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
521 *International and Comparative Patent Law*
562 *Income Taxation of Foreign Business and Investment*

TAXATION

Faculty Advisers: J.R. Hambrick, D.B. Weaver

551 **Taxation—Partnerships and Subchapter S** (2) Weaver

Income tax problems of partnerships and tax-option corporations (Sub-chapters K and S of the Internal Revenue Code of 1954). Prerequisite: Law 336. (Examination) (Spring—evening)

553 **Seminar: Estate Planning** (2) Weaver, Speiller, Horowitz

Study of the effective disposition of wealth by inter vivos gift and testamentary transfer; emphasis on income, estate, and gift tax considerations; use of the trust form in the transfer of wealth; use of insurance and jointly held property as part of the estate plan; planning for the continuation or disposition of the client's business interests. Preparation of an estate plan, with supporting documents is the major project for the course. Prerequisite: Law 325, 326, 336, and 338. (Problem Assignments) (Spring—evening; summer 1973)

555 **Taxation—Special Corporation Problems** (2) Libin

Detailed study of the principal federal tax benefits of the corporate form of doing business. Consideration of problems involved in the tax planning of the corporate structure and corporate operation, including the tax definition of a corporation, the special deductions available to corporate payers, the compensation of the corporate executive and employee, the debt-equity question, the accumulated earnings tax, the personal holding company tax, multiple corporations, and consolidated returns. Survey of the types of corporations receiving special treatment under the Internal Revenue Code, such as financial institutions, real estate investment trusts, regulated investment companies, cooperatives, and small business corporations. Prerequisite: Law 340. (Research Paper) (Spring—evening)

557 **Taxation—Exempt Organizations** (2) Chabot, Hopkins, Myers, Oppenheim

Tax-exempt organizations: policy and practice of preferred tax treatment for selected organizations and gifts to them. Statutes, regulations, and IRS practice; legislative origins, judicial interpretations, and policy considerations. Tests of qualification, disqualification, and limited tax preference. Mechanics of securing and retaining exemption; qualified exemption; unrelated business income; private inurement, political activity. Denial or loss of exemption. Return and reporting requirements. Compu-

tive tax treatment of nonexempt and nonprofit organizations. Special sanctions with respect to private foundations, managers, and donors for improper, excessive, or prohibited activities. Enrollment may be limited. Prerequisite: Law 336. (Examination) (Fall and spring—evening)

558 **Taxation—Real Estate and Income** (2) Tucker

The effect of income taxes on the real estate market and real estate transactions: sales and exchange of real estate interests; various entities for the ownership and development of real estate; the impact of taxes on the landlord and tenant; the impact of taxes on the mortgagor and mortgagee, including the choice of financing techniques, such as the sale-leaseback; depreciation, amortization, and obsolescence; basis and basis adjustments; and casualties and other involuntary conversions. Prerequisite: Law 336. (Examination) (Spring—evening)

559 **Taxation—Oil and Gas** (2) Hambrick

Application of federal income tax law to producing segment of oil and gas industry. Classification of interests; treatment of exploration and development expenditures. Depletion allowance and concept of "economic interests." Sales and "ABC" transactions. Organization problems. Prerequisite: Law 336. (Examination)

560 **Taxation—State and Local** (2) Field

Taxation by state and local governments; problems of real and personal property taxation, sales and use taxes, business and personal income taxes. Limitations on taxation of interstate commerce. Congressional problems. Prerequisite: Law 336. (Choice of Paper or Examination) (Spring—evening)

562 **Income Taxation of Foreign Business and Investment** (2) Hambrick

The provisions and policies of the federal income tax law applicable to foreign income, including considerations affecting the choice of methods of engaging in foreign business and investment, treatment of controlled foreign corporations, allocation of income in foreign commerce, credit for foreign taxes, principles and trends of U.S. tax treaties. (Examination) (Spring—evening)

564 **Seminar: Special Problems of Tax Policy** (2) Ellicott

Intensive study of selected aspects of the tax structure with primary attention given to the federal income tax. Problem areas are reviewed primarily from the standpoint of tax policy, including legal, economic, social, and practical considerations. Alternative solutions, including current legislative proposals, are examined. Prerequisite: Law 336, 340. (Research Paper) (Fall—evening)

567 **Seminar: Tax Practice and Procedure** (2) Kapp, Troyer

Review of the major areas of tax practice, including organization of the Internal Revenue Service, legislation, administrative regulations, tax planning, tax rulings, tax audit, settlement procedures, claims for refund, tax collection processes, criminal tax practice, and ethical problems in tax practice. Preparation of various documents is required. Prerequisite: 5 semester hours of taxation, including Law 336. (Problem Assignments) (Spring—evening)

568 **Seminar: Federal Tax Litigation** (2) Treusch

Choice of forum. Conduct of civil tax cases: trial practice in the Tax Court, the District Courts, and the Court of Claims; appeal practice in the

Courts of Appeals and on certiorari to the Supreme Court; analysis and drafting of pleadings, motions, and briefs; oral argument; settlements and stipulations of fact. Comparative responsibilities and procedures of IRS and of the Department of Justice for litigation control. Prerequisite: Law 567. (Writing Assignments) (Spring—evening)

Master of Laws candidates in the area of Taxation who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

336 *Taxation—Federal Income*
338 *Taxation—Federal Estate and Gift*
340 *Taxation—Federal Income, Corporations and Shareholders*
351 *Law and Accounting*

OTHER RELATED COURSES

403 *Public Economic Policy and the Law*
404 *Securities Regulation*
424 *Business Planning*
427 *Legal Aspects of International Business Transactions*

URBAN LEGAL STUDIES

Faculty Advisers: R.S. Kuhn, M. Pock, D.P. Rothschild McGrath*

571 Land Development Planning (3)

Selected problems in urban and regional planning: applications of zoning, urban renewal, and special programs available for the implementation of development plans. (Examination and Paper) (Spring—evening)

575 Community Economic Development (2) Leftwich, Stevenson

A substantive study of the organizational, financial, and tax-planning aspects of nonprofit, cooperative, and small business organizations. Problems illustrating some of the legal considerations of a nonprofit organization and a small business. Consideration of the problems of economic development and current efforts to stimulate it. Prerequisite: Law 336. (Problem Assignments) (Fall—evening; spring—day)

579 Clinical Studies in Urban Law (2 or 3)

Service in the Community Legal Clinic under the supervision of the Director of the Clinic. The Clinic helps Washington, D.C., area agencies and community groups with the problems of the inner-city and Washington's black and Spanish-speaking residents. Students are assigned to specific projects, such as providing legal counsel to the Director of the Neighborhood Development Center in Anacostia; investigating job discrimination complaints, including working with volunteer attorneys suing for relief; assisting in the preparation and conduct of a class action to remedy alleged police misconduct in a nearby black community; analyzing pending legislation and preparing testimony for an organization of ex-convicts

* Dorn Charles McGrath, Jr., is Professor of Urban Planning and Chairman of the Department of Urban and Regional Planning in the School of Government and Business Administration.

and working with urban planning students in preparing proposals for construction of housing and community facilities on surplus federal lands in Southeast Washington. Students who perform 10 hours' service each week for the semester receive 2 semester hours of credit; students who perform 15 hours' service each week for the semester receive 3 semester hours of credit. May be repeated for credit not to exceed 6 semester hours. This course may not be taken at the same time as Law 345, 487, or any litigating activities in Law 346. The grade of *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring)

Descriptions for the other courses in this area (listed below) appear elsewhere in "Advanced Courses."

451 **Federal Programs in Urban Poverty** (2)

458 **Housing the Poor** (2)

459 **Problems of the Consumer** (2 or 3)

501 **Land Development Law** (3)

505 **Intergovernmental Relations I** (2)

506 **Intergovernmental Relations II** (2)

560 **Taxation—State and Local** (2)

Master of Laws candidates in the area of Urban Legal Studies who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

349 *Local Government Law*
445 *Labor Relations in State and Local Governments*
477 *The Police and the Community*

OTHER RELATED COURSES

460 *Current Problems in Civil Rights*
475 *Law and Criminology I: Search for the Causes of Criminal Behavior*
476 *Law and Criminology II: Society's Responses to the Criminal Offender*
487 *Interdisciplinary Seminar on the Juvenile Court*
592 *Seminar: Constitutional Law*

OTHER ADVANCED COURSES

590 **Population Control and the Law** (2) **Miller**

Consideration of the concept of an "optimum" population through an examination of existing statutes which encourage or discourage population growth; relevant Supreme Court cases; international policies of a public law nature leading to population stabilization; and proposed legislation. (Research Paper) (Spring—day)

591 **Legislative Drafting** (2) **Zweben**

Advanced instruction and practice in legislative drafting; overview of legislative process with emphasis on legislative drafting. Enrollment limited to 30 students. (Problem Assignments) (Spring—evening)

592 **Seminar: Constitutional Law** (2) Dixon, H. Green, Silard

Group study of contemporary problems in constitutional law; process of constitutional litigation; problems of effectuating constitutional guarantees. Enrollment limited to 36 students. (Research Paper) (Fall—day)

593 **Seminar: American Legal History** (2) D. Green

From the outbreak of the Revolution at Lexington and Concord to the death of John Marshall. An examination of men, events, and movements significant in the unfolding of our laws and legal institutions in this formative period of our national life, including a critical examination of the place of the lawyer in a revolutionary age. Comparison of the role of the lawyer during the politically and socially unsettled time of Marshall with the role of the lawyer in today's troubled scene. Each member of the seminar presents the results of his research and thought either by an oral or by a written report. The grade of *CR* (Credit) or *NC* (No Credit) is given for this course. (Problem Assignments) (Fall—as arranged)

Park

594 **Seminar: Privacy** (2)

Detailed study of civil interests in freedom from intrusion, with problems including government surveillance, private investigations, psychological testing, state regulation of marital relations, and conduct restrictions of public institutions. Discussions based on a small number of cases, selections from the literature of psychology and psychoanalysis, legal readings, and student research memoranda and papers. Students should have a substantial academic background in at least one of the following areas: psychology, sociology, philosophy, or civil rights law. In addition to the research paper, weekly memoranda will be required. Enrollment limited to 24 students. (Research Paper)

Gressman

595 **Seminar: Supreme Court Practice** (2)

Study of the jurisdiction, practice, and procedure of the Supreme Court of the United States. Certiorari and appeal; the Court's Rules of Practice; how to prepare petitions and jurisdictional statements; the internal operation of the Supreme Court; other related aspects of Supreme Court practice, such as bail and stay applications, use of extraordinary writs, motion practice, oral argument, and briefing; *in forma pauperis* procedures. Students will prepare documents used in Supreme Court practice—petitions for certiorari, jurisdictional statements, and opposing briefs and arguments—using the actual conference list of cases pending before the Court. (Research Paper) (Spring—day)

596 **Seminar: Contracts** (2)

Advanced problems in contracts, such as the relationship of contract and tort (substantively, procedurally, and in measuring damages), Article 2 of the Uniform Commercial Code, product liability, commercial frustration, unconscionability, remedies, anticipatory breach, consumer's rights and professional responsibility of the civil practitioner. Hours arranged at the convenience of the students. Admission by permission of instructor. (Research Paper)

St

597 **Independent Studies** (arr.)

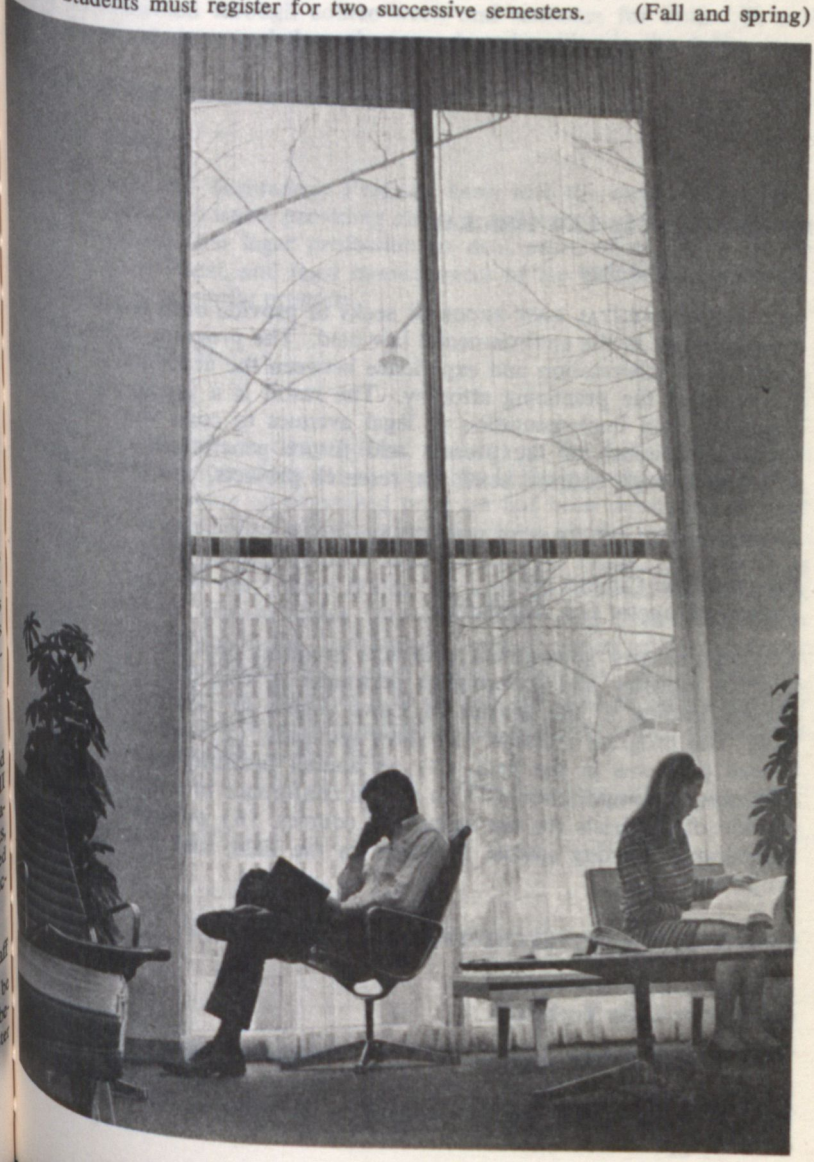
Limited to teaching fellows. The proposed program of study must be submitted to a faculty member in writing and approved prior to the beginning of the semester. May not be elected for more than 12 semester hours of credit. (Fall and spring)

598 **Research in Public Law** (2) Staff

Registration limited to students with at least a *B* average who have had a seminar or comparable course in field of proposed research. Students are responsible for obtaining an adviser from the full-time faculty who is willing to sponsor their research. This adviser's name must be submitted to the Dean at registration. Work must be completed within the semester and paper submitted not later than last day of classes. Students may repeat this course once for credit with the approval of the Dean. (Research Paper) (Fall and spring)

599–600 **Thesis** (2–2)

Students must register for two successive semesters. (Fall and spring)



SPECIAL PROGRAMS IN RESEARCH AND INSTRUCTION

ENVIRONMENTAL LAW PROGRAM

Director A.W. Reitze

THE ENVIRONMENTAL LAW PROGRAM seeks to provide both academic and clinical experience in the environmental law field. The program is predicated on an exchange of information and experience between the academic community and the world of the practicing attorney. The result is a forum for presentation, discussion, and implementation of legal avenues to cope with the critical environmental issues of the present and future generations. These goals are achieved through courses, seminars, research projects, and clinical activities.

GOVERNMENT CONTRACTS PROGRAM

Director John Cibinic, Jr.
Assistant Director G.J. Ginsburg

A comprehensive government contracts program provides continuing instruction for industry and government personnel in this field and a program of courses leading to the Master of Laws degree in Government Procurement Law. The program includes (1) short seminars, (2) one-week courses in advanced problems in the field, (3) an annual institute treating a problem of contemporary importance, (4) an annual conference in a major area, (5) compilation of materials for use in current courses, (6) publication of a series of monographs treating special problems in the field, and (7) special research projects.

INSTITUTE OF LAW, PSYCHIATRY, AND CRIMINOLOGY

Director R.C. Allen
Co-director Leon Yochelson

The Institute of Law, Psychiatry, and Criminology draws upon the insights and techniques of the behavioral sciences in areas of mutual concern to law and its sister disciplines, with special emphasis in the fields of forensic psychiatry and criminology.

NTERNATIONAL LAW PROGRAM

irector W.T. Mallison

he objective of the International Law Program is to provide a better under-anding of how decisions in international law are actually made and the im-rovements which are needed in decision-making, sanctions processes, and ccompanying legal institutions to promote the extension of the rule of law the world community while considering the relationship between domestic nd international law. The Program also includes the international aspects of usiness transactions and economic development. The objectives of the Pro-ram are implemented through course work and seminars for both J.D. and ost-J.D. degree students and through research and writing in the field.

W, SCIENCE, AND TECHNOLOGY PROGRAM

irector H.P. Green

he Law, Science, and Technology Program deals with the reciprocal relation-ips between law and science, providing courses, seminars, research studies, and blications to equip the legal profession to deal more effectively with the cial, economic, political, and legal consequences of the nation's present mas-e commitment to scientific progress.

ATENT LAW PROGRAM

irector Irving Kayton

he Patent Law Program is designed for students in the J.D. and Post-J.D. gree programs whose intentions are to specialize in the practice of patent law. uring the past eight years an organized program has been developed to offer complete and as integrated collection of courses in patent law as possible. e course offerings in patent law now total 17 semester hours, far more than y other law school in the United States. In addition, courses in trademark d copyright law are also available (see the "Patent and Trade Regulation ea" area of specialization in the "Advanced Courses" section of this catalogue r a complete list and detailed description of the patent law courses offered). e object of the Patent Law Program is to provide the student with a concen-ation in patent law at a level of specialization and maturity which will enable m to advance more rapidly in this field.

THE GEORGE WASHINGTON LAW ASSOCIATION

Director of Law Alumni Relations Clifford A. Dougherty, J.D.(W.H.) 1964

THE GEORGE WASHINGTON LAW ASSOCIATION was founded in 1912 and has been affiliated with the General Alumni Association since 1926. Its purposes as stated in the constitution are to promote high standards of legal education, to keep the alumni of the school in close touch with one another, especially with members of their own classes, to gather and publish at intervals information as to the whereabouts and activities of these alumni, and to further the interests of the school.

Eligible members are those who have matriculated in the school or National University and have left in good standing, and any member or former member of the faculty of the school. Active members are those eligible members who are current contributors to the Law Annual Support Program of the University and life members of the George Washington Law Association.

The Association plans publication periodically of the Law Alumni Directory. Law alumni are urged to keep the Alumni Office informed of their whereabouts so that directory information can be kept up to date.

The Law Alumni Office is in the University Library, 2130 H Street, N.W., Washington, D.C. 20006.

OFFICERS FOR 1972-73

President.—F. Elwood Davis, LL.B. 1943; Washington, D.C.
First Vice President.—Marion Edwyn Harrison, LL.B. 1954, LL.M. 1959; Washington, D.C.
Second Vice President.—Richard A. Ward, B.A. 1961, J.D.(W.H.) 1965; Washington, D.C.
Third Vice President.—Betty Ann Thompson, B.A. 1946, LL.B. 1948; Arlington, Va.
Secretary.—Michael P. Bentzen, LL.B. 1964; Washington, D.C.
Treasurer.—Donald L. Mooers, LL.B. 1963; Washington, D.C.
Executive Committee:
Joseph D. Bulman, LL.B. 1931; Washington, D.C.
James C. Cacheris, J.D.(W.H.) 1960; Alexandria, Va.
Alvin Capp, B.A. 1961, J.D.(W.H.) 1964; Fort Lauderdale, Fla.
Lawrence R. Caruso, B.A. 1949, J.D. 1950, LL.M. 1953; Washington, D.C.
Donn E. Cassity, B.A. 1950, J.D. 1953; Salt Lake City, Utah
Donald H. Ching, LL.B. 1953; Honolulu, Hawaii
Fred H. Daly, J.D. 1966; Akron, Ohio

Rae Ann Fichtner, J.D. 1952; Dallas, Texas
Marshall C. Gardner, B.S. 1943, M.S. 1950, J.D.(W.H.) 1955; Washington, D.C.
Harold H. Greene, J.D.(W.H.) 1952; Washington, D.C.
Paul F. Hannah, J.D.(W.H.H.) 1933; Boston, Mass.
C. Timothy Hopkins, LL.B. 1963; Idaho Falls, Idaho
Joe L. Horne, J.D.(W.H.H.) 1951, LL.M. 1964; New Orleans, La.
James P. Hume, LL.B. 1926; Chicago, Ill.
Charles H. Landesman, LL.B. 1963; Newark, N.J.
James R. Loftis III, J.D.(W.H.) 1968; Washington, D.C.
Carlos F. Lucero, J.D. 1964; Alamosa, Colo.
Charles L. Marinaccio, J.D.(W.H.) 1962; Washington, D.C.
Robert C. McCandless, B.A. 1961, Law (1963); Washington, D.C.
William P. McClure, J.D.(W.H.) 1951, LL.M. 1954; Washington, D.C.
Bruce S. Mencher, B.A. 1957, J.D.(W.H.) 1960; Washington, D.C.
Milton E. Mermelstein, B.A. 1930, J.D. 1931; New York, N.Y.
Alice L. O'Donnell, LL.B 1954; Washington, D.C.
Robert L. Oswald, LL.B. 1964; Washington, D.C.
Paul L. Pascal, J.D. 1965; Washington, D.C.
Thomas D. Phelps, J.D. 1963; Los Angeles, Calif.
Edward A. Potts, LL.B. 1952; Washington, D.C.
B.R. Pravel, J.D.(W.H.) 1951; Houston, Texas
Charles Price, J.D.(W.H.) 1972; Washington, D.C.
Harry M. Reid, J.D. 1964; Las Vegas, Nev.
Charles K. Schanker, B.B.A. 1966, J.D.(W.H.) 1969; Washington, D.C.
John V. Skinner, J.D.(W.H.) 1962; Atlanta, Ga.
Thomas F. Smegal, J.D. 1961; San Francisco, Calif.
Alexander L. Stevas, B.A. 1949, LL.B. 1951; Washington, D.C.
Gary L. Theurer, J.D. 1954; Washington, D.C.
Robert P. Visser, J.D.(W.H.) 1966; Washington, D.C.
Sterry R. Waterman, Law (1926); St. Johnsbury, Vt.
Lewis H. Weiss, J.D. 1930; St. Petersburg, Fla.
J.D. Williams, J.D. 1962; Washington, D.C.
Leon L. Wolfstone, J.D.(W.H.) 1939; Seattle, Wash.
Philip F. Herrick, *ex officio*, LL.B. 1933, LL.M. 1936; Washington, D.C.

THE UNIVERSITY

HISTORY AND ORGANIZATION

THE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington, whose name it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the Federal City. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended "a fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "that persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets extending north from Florida Avenue to somewhat beyond Columbia Road. The Medical School was located downtown. For the better part of the Columbian University period, the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half century the University's present plant has been developed that section of the old First Ward familiarly known as "Foggy Bottom," ween Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. e area is not without its reminders of historic interest to the University. Pres- nt Monroe, who signed the Charter, lived at 2017 Eye Street. The first Pres- nt of the Board of Trustees, the Reverend Obadiah B. Brown, was for fifty ars the pastor of a church at Nineteenth and Eye Streets, and Washington lected Twenty-third and E Streets as the site of the National University he d hoped to see established.

The University as it is now organized consists of Columbian College of Arts d Sciences (undergraduate); the Graduate School of Arts and Sciences; the ofessional schools, which include the National Law Center and the schools Medicine and Health Sciences, Engineering and Applied Science, Education, vernment and Business Administration, Public and International Affairs; the llege of General Studies; the Division of University Students; and the Sum- r Sessions.

The George Washington University is privately endowed and is governed by lf-perpetuating Board of Trustees of which the president is an ex officio mber.

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e George Washington University is accredited by its regional accrediting ency, the Middle States Association of Colleges and Secondary Schools. The iversity is on the approved list of the American Association of University men and is a member of the College Entrance Examination Board.

ATION

e University is in downtown Washington, between Pennsylvania Avenue and , F, and 24th Streets, N.W. In immediately adjacent areas are the White se, the World Bank, the United States Information Agency, the Department e Interior, the Department of State, the General Services Administration, National Academy of Sciences, and the Kennedy Center for the Performing

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David Benson Weaver, *Professor of Law*
B.A. 1943, Ohio Wesleyan University; J.D. 1948, Case Western Reserve University

Glen Earl Weston, *Professor of Law*
B.S. 1943, University of Maryland; J.D. 1948, George Washington University

John Leslie White, *Professorial Lecturer in Law*
B.A. 1948, M.S. 1949, Kalamazoo College; J.D. 1958, George Washington University

Dudley Ridault Williams, *Associate Professorial Lecturer in Law*
B.A. 1961, LL.B. 1964, Howard University

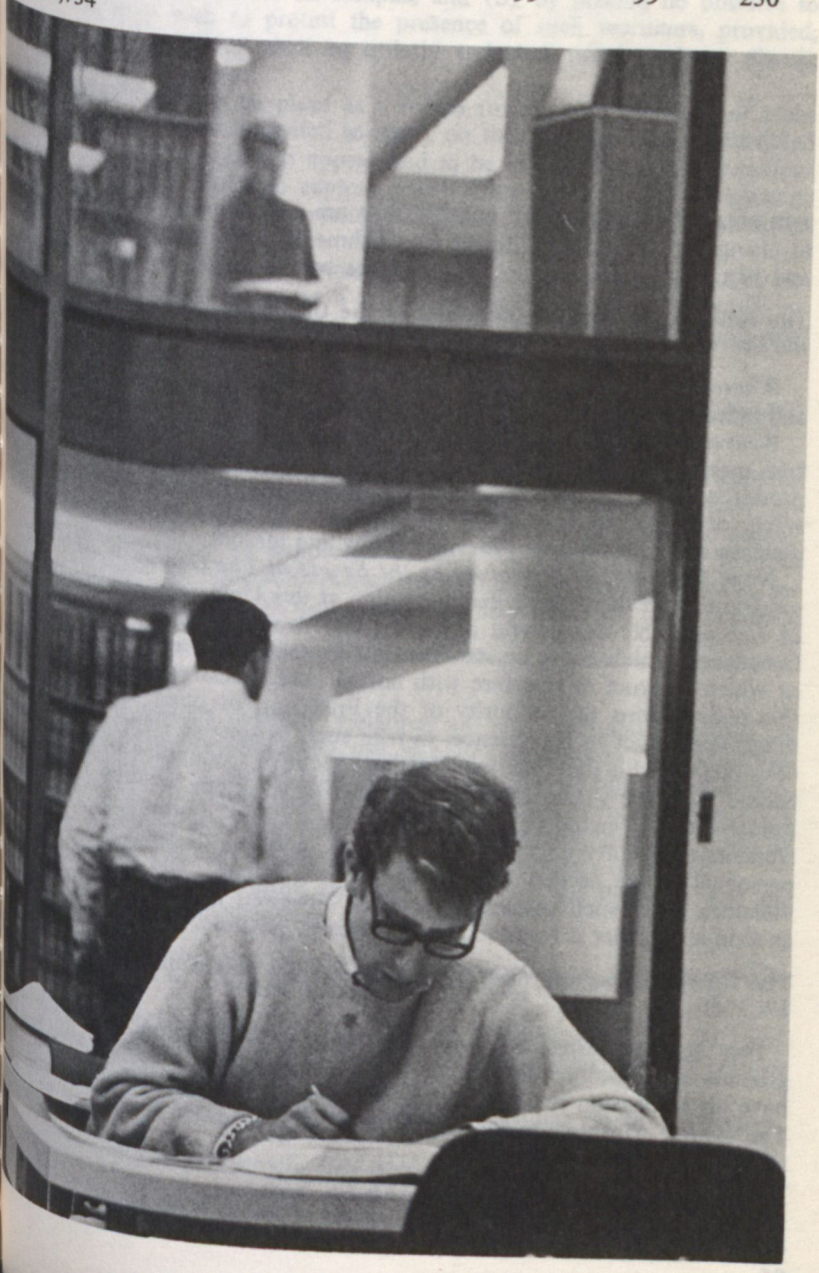
Judy Lyons Wolf, *Assistant Professorial Lecturer in Law*
B.A. 1964, Manhattanville College of the Sacred Heart; J.D. 1970, Georgetown University

Murray Zweben, *Associate Professorial Lecturer in Law*
B.S. 1952, M.S. 1953, State University of New York at Albany; LL.B. 1959, George
Washington University

Summary of Registration, Fall Semester 1972–73

	1st year	*2d year*	*3d year*	*4th year*	*Graduate*
Day	318	321	359	.....	40
Evening	96	93	99	99	230

Total: 1,734



APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subje
to change in connection with the establishment of judicial processes. Bulleti
and handbooks incorporating any changes will be issued as appropriate.

**The following resolution, submitted by the University Senate, was approved b
the University's Board of Trustees on October 19, 1968:**

Whereas, safety and order are essential preconditions of the learning proces
and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection o
free speech and freedom of assembly, and to safeguarding the right of lawf
protest on campus; and is committed equally to maintaining the peace an
safety of the campus, in the knowledge that all rights are in jeopardy whe
violence and civil disorder prevail over law and reason;

*Now, therefore, be it resolved by the Senate of The George Washington Un
versity:* that in the event a demonstration at this University exceeds the boun
of free assembly and lawful advocacy, and demonstrators are engaging in u
lawful acts which cause or imminently threaten injury to persons or propert
or which obstruct or interfere with normal and necessary University activitie
this body affirms the authority of the President, or other University officia
designated to act in his absence, to take such reasonable steps, if possible aft
consultation with the Chairman of the Executive Committee of the Universi
Senate* and the President of the Student Body, as are required to restore an
preserve order; including, if deemed necessary and appropriate, suspension
students or faculty engaging in such acts, and use of such law enforcemen
personnel as are needed to effect the removal, arrest, and prosecution of la
violators. Any such suspension shall be reviewed by an appropriate tribun
as soon after order is restored as is practicably possible.

**The following was approved by the University's Board of Trustees on Octob
19, 1968:**

Any student suspended from The George Washington University on t
grounds of exceeding the bounds of free assembly and lawful advocacy sha
have his suspension reviewed by the Hearing Committee on Student Affairs†
The George Washington University as soon after order is restored as is pra
ticably possible.

* The University Senate has been renamed the Faculty Senate.
† The duties and functions of the Hearing Committee on Student Affairs are now performed by
Student-Faculty Committee on Appeals.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968*:

The George Washington University is opposed to discrimination based on race, color, creed, sex, or national origin. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

(a) who engages in conduct that unreasonably obstructs teaching, research, and learning, or

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

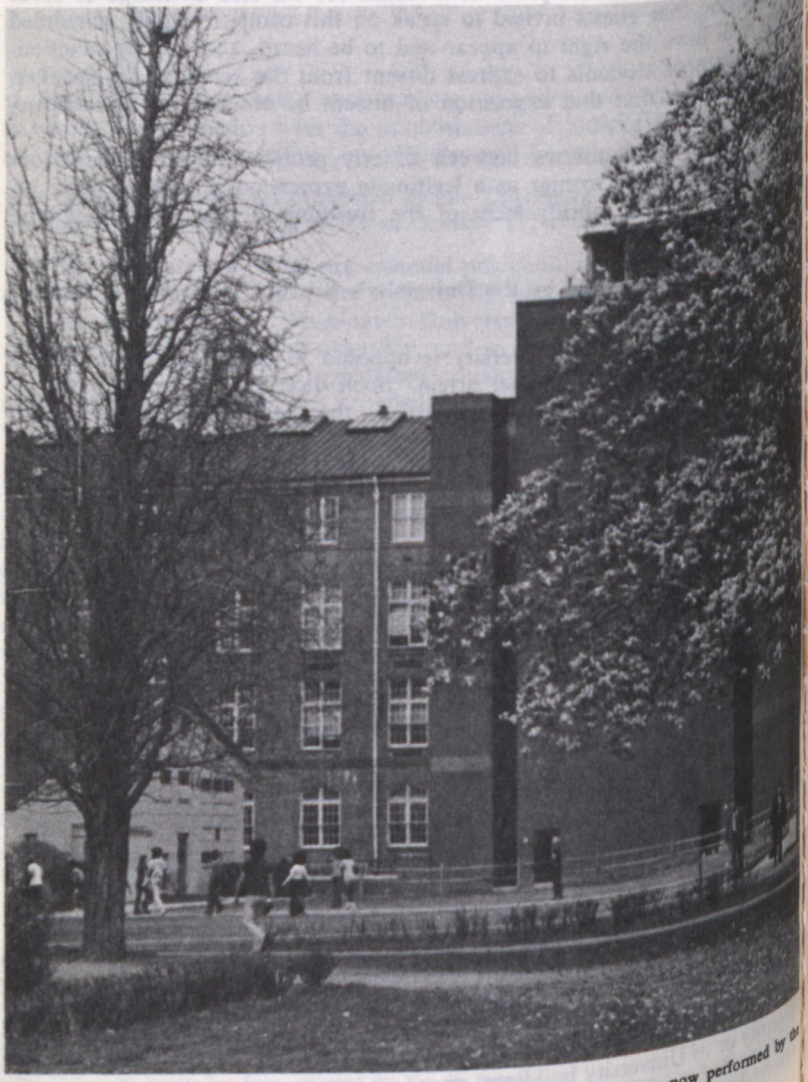
*Amended January 18, 1973.

(c) who disobeys general regulations of the University, or

(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established within the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*



* The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

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NATIONAL LAW CENTER, Dean of the Center

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ATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master f Comparative Law (M.Comp.L.), Master of Comparative Law (American ractice) (M.Comp.L.(Am.Prac.)), and Doctor of Juridical Science (S.J.D.)

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THE GEORGE WASHINGTON UNIVERSITY

COLUMBIAN COLLEGE OF ARTS AND SCIENCES, 1821

THE GRADUATE SCHOOL OF ARTS AND SCIENCES, 1893

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES, 1825

THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, 1928

THE DIVISION OF UNIVERSITY STUDENTS, 1930

THE COLLEGE OF GENERAL STUDIES, 1950

THE SUMMER SESSIONS, 1916

THE UNIVERSITY HOSPITAL, 1898

THE GEORGE WASHINGTON UNIVERSITY BULLETIN

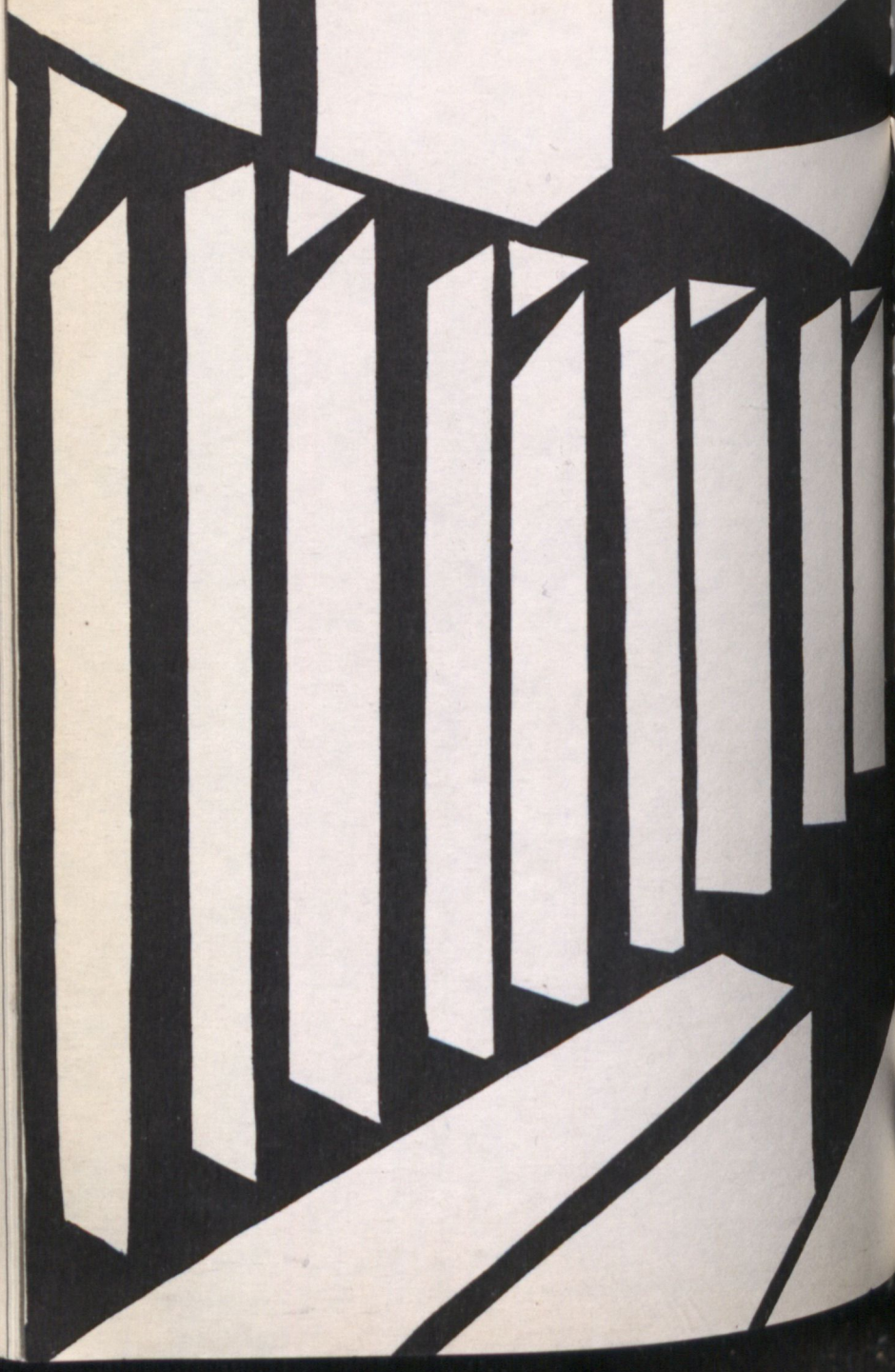
SCHOOL OF ENGINEERING AND APPLIED SCIENCE

1973-1974

THE GEORGE WASHINGTON UNIVERSITY BULLETIN
Volume LXXII, Number 7, April, 1973

Published by the University at Washington, D.C. 20006
MONTHLY: JANUARY, MAY, JUNE, JULY (2 ISSUES IN DECEMBER, FEBRUARY, AND APRIL)

Second Class Postage Paid at Washington, D.C.



THE GEORGE WASHINGTON UNIVERSITY BULLETIN

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE 1973–74

WASHINGTON, D.C. 20006

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June 11	Registration for first 5-week session and 7-week cour *Monday*
June 12	First 5-week session and 7-week courses begin *Tues*
July 4	Holiday *Wednesday*
July 18	First 5-week session ends *Wednesday*
July 19	Registration for second 5-week session *Thursday*
July 20	Second 5-week session classes begin *Friday*
July 30	Seven-week courses end *Monday*
August 24	Second 5-week session ends *Friday*

1973 FALL SEMESTER

August 31	Orientation for students from foreign countries *Fri*
September 4	Placement tests for entering students *Tuesday*
September 5	Advising for all students *Wednesday*
September 6–8	Registration—Tompkins Hall of Engineering *Thursda* *Saturday*
	Application for February graduation due as part of re istration
September 8–9	Activities for new students *Saturday–Sunday*
September 10	Classes begin *Monday*
November 20	D.Sc. dissertations of February candidates due *Tues*
November 21	Thanksgiving recess begins after last class *Wednesday*
November 26	Classes resume *Monday*
December 3	Master's theses of February candidates due *Monday*
December 6	Last day of fall-semester classes *Thursday*
December 12–21	Examination period *Wednesday–Friday*

1974 SPRING SEMESTER

January 8–9	Advising for all students—*Tuesday–Wednesday*
January 10–12	Registration—Tompkins Hall of Engineering *Thursda* *Saturday*
	Application for May graduation due as part of regist tion
January 14	Spring-semester classes begin *Monday*
February 18	Winter Convocation (holiday) *Monday*
March 9	Spring recess begins after last class *Saturday*
March 18	Classes resume *Monday*
March 19	D.Sc. dissertations of May candidates due *Tuesday*
April 5	Master's theses of May candidates due *Friday*
April 19	Last day of spring-semester classes *Friday*
April 25–May 4	Examination period *Thursday–Saturday*
May 5	Commencement *Sunday*

* This calendar is subject to change.

1973

JULY

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30						

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30	31					

1974

JANUARY

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	29	30	31		

FEBRUARY

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24	25	26	27	28		

MARCH

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24	25	26	27	28	29	30
31						

APRIL

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29	30				

MAY

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JUNE

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SEPTEMBER

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NOVEMBER

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DECEMBER

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TO ALL PROSPECTIVE STUDENTS:

The School of Engineering and Applied Science has been in continuous session since 1884, and offers programs of study leading to Bachelor's, Master's, and Doctor's degrees. Its prime objective is to educate the student so that he will have the precious asset of a well-trained mind which may be applied to the attainment of our many national objectives. In these changing times, it is necessary to search for quality. Students and faculty have the opportunity of assisting in the planning and implementation of educational programs. Examination is made periodically of the School's objectives and how they relate to those established by the Engineering Council for Professional Development (ECPD). Emphasis includes such items as the student's basic and advanced levels of education and his role in present and future society.

This catalogue describes the programs and requirements for undergraduate and graduate study in the School of Engineering and Applied Science and includes information on the Cooperative Education Program in Engineering and the Joint Institute for Acoustics and Flight Sciences (JIAFS).

The Cooperative Education Program in Engineering provides the undergraduate engineering student with the opportunity to obtain an enduring foundation in engineering education by combining academic learning with practical, first-hand experience in the student's chosen field of engineering. The student's earnings will help him pay for a major part of the cost of his education.

JIAFS was created by the joint efforts of the NASA-Langley Research Center and the School of Engineering and Applied Science. The education and research opportunities offered in the program combine the academic resources of George Washington University and the professional research resources and facilities of NASA-Langley Research Center to prepare qualified graduate students for careers in research, development, design, and teaching.

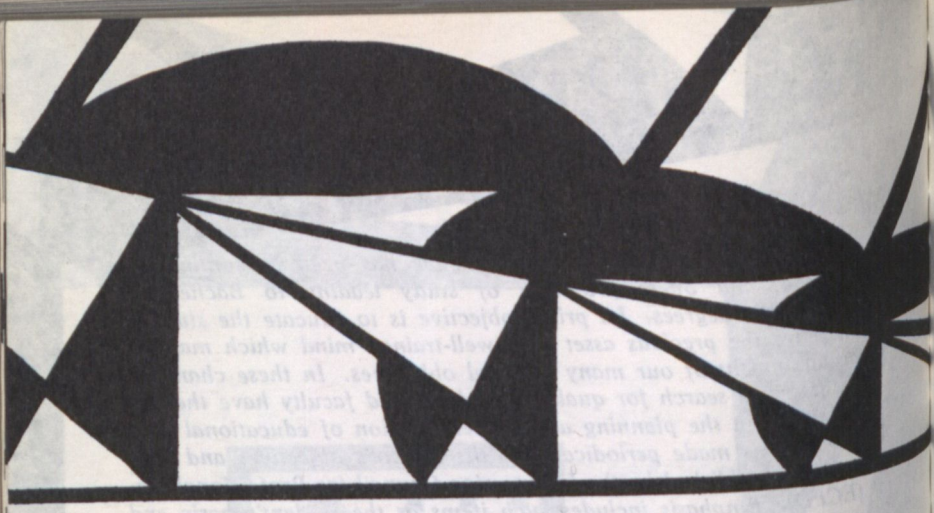
The School of Engineering and Applied Science is a professional school in a university comprised of eight degree-granting schools and colleges. The environment of the nation's capital is very favorable for the intellectual and cultural development of the student. The metropolitan Washington area contains the second largest concentration of research and development in the United States, and the engineering component of this activity is similarly extensive offering many employment opportunities to students after graduation.

The atmosphere of the School is one of serious-minded effort toward mature development. Being a small school, it recognizes the individual as the single most important element in the educational process. The student body, undergraduate and graduate, has a primary interest in design, research, development, and management in both scientific and engineering activities. Many alumni of the School are successfully engaged in all fields of engineering—in science, management, government, and education.

The philosophy of the School, which might be summarized as "education for creativity, not conformity," has through the years reflected the many subtle and profound changes in the engineering profession.

The faculty of the School and I look forward to providing a closer and more fruitful relationship with you. If you need additional information, please do not hesitate to call upon the Department Chairmen or me.

HAROLD LIEBOWITZ
Dean



THE STUDY OF ENGINEERING

THE MEANING OF ENGINEERING AND APPLIED SCIENCE

ENGINEERING IS A BROAD PROFESSION. Its responsibilities and activities extend into every aspect of industry and research, and into many fields of commerce and the arts. Engineers have faced and continue to face problems in the production and distribution of all types of manufactured products, including the design of mechanical, electrical, and chemical processes, of equipment, and of plants in which such products are made; in the design and construction of an infinite variety of structures such as bridges, tunnels, harbors, and dams; in aircraft design and construction, including complicated electronic equipment for control, guidance, and communication; in the operation of transportation systems; in the wide spectrum of activities existing in the automotive industry; in the missile and space programs; in the generation and transmission of power; in the modern phases of communication; in the control of traffic; in city planning; in public health and sanitation as it affects the environment; and in ventilation and refrigeration. This list of applications is far from exhaustive; it does indicate, however, that engineering is a broad profession in which there are many specialists.

THE RELATIONSHIP OF ENGINEERING AND SCIENCE

In any discussion of "engineering and applied science," it is important to emphasize the distinction between engineering and science. The President's Scientific Advisory Committee points out that the engineer and scientist each play an important role on a team. "The scientist is one who seeks to extend the boundaries of knowledge in his chosen field. The engineer has the task of combining the knowledge of science with his knowledge and awareness of the needs and limitations of human beings and of a human society to develop and create things for human use. . . . While scientists have uncovered the basic knowledge, it is the engineers who have created the tangible tools, materials, and products that have revolutionized our daily lives, our community living, and our national defense."

The work of engineers is a focal point at which scientific knowledge, the use of such knowledge as a service to society, financial material, human resources, and society's needs are interrelated. The engineer is concerned, therefore, with the means for operating a dynamic society. He must consider not only whether the knowledge that exists will enable him to create a workable product, but also how the product can be built, who will use it, and how such use will affect the environment in which it will operate.

THE PROFESSIONAL ENGINEER

Engineers are concerned with the quality and preservation of human life. Engineer, as the term is used in this catalogue and as it is commonly understood in our society, refers to the person who makes use of the advances of science and technology in an economically feasible manner for the benefit of society. This process is complex and challenging. Although the content of engineering curricula is certainly scientific, the engineer has not lost his sense of purpose in serving as an intellectual agent in the practical world. This responsibility of the engineer arises from the breadth of the implications of engineering for the whole of society as well as from the depth of the requirements for competence. Technology has radically rearranged human life in our time. There are many who believe that, although the threshold of space has been crossed, the union of medical and engineering practice has been achieved, and breakthroughs have been made in other areas, this impact of engineering on modern life is just a modest preview of the engineering of tomorrow.

ENGINEERING EDUCATION AND THE STUDENT

Rapidly changing and advancing engineering activity requires an education for the future based on fundamental principles of science useful in applications to a dynamic, advanced society. In the fields of engineering and applied science there is no substitute for demonstrated ability and competence to solve the problems faced. Without question, achievement in particular courses of study is important. Equally important, however, is the ability to analyze and interpret all the aspects of a problem, to formulate solutions, and to evaluate those solutions in the light of all available information. The attainment of this objective is the basis for undergraduate education. The undergraduate program of the School of Engineering and Applied Science is subjected to periodic evaluation and appraisal by the faculty.

The curricula of the School of Engineering and Applied Science are founded on one basic principle—to assist the student in preparing for a career in engineering and applied science. This philosophy requires that the student master the principles on which future practice will be based and that he receive an education centered on that meaningful junction between theory and practice so that throughout his professional life he can follow the many interests and opportunities that may develop.

It should not be assumed, however, that only the intellectual elite should consider the study of engineering and applied science. Engineering, like medicine, law, education, science, history, government, and other disciplines, requires scholars. But in any of these areas, even though the prospective student has not achieved high scholastic standing, if he is genuinely interested in the subject, he can probably find a place for himself. Those who are mod-

erately well-endowed with mental ability and who are interested and willing to work will find in engineering and applied science a rich and varied field of study which can lead to satisfaction and success. It is difficult to make generalizations in this area, but if a student has demonstrated an aptitude for mathematics, science, and English, he will probably find the work of engineers and the study of engineering and applied science satisfying and challenging. Innate intellectual curiosity and the desire to learn and to work hard are good indicators of success. College Board examinations may reveal the capacity to manage further study in mathematics and science and their applications to engineering. No school or college can "give" an education. It can offer only the opportunity to "get" an education. The George Washington University's School of Engineering and Applied Science is a small school which provides an opportunity for close liaison with faculty members, as well as the opportunity to participate in matters of student concern—in organizations, by working on the magazine, and through other student activities. The School recognizes the individual as the most important element in the educational process.

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE

HISTORY

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE was organized October 1, 1884, as the Corcoran Scientific School of Columbian University and was situated in the University Building then at 15th and H Streets, N.W. The School was named in honor of William W. Corcoran, Trustee and President of the Corporation from 1869 to 1888. Day and evening courses were offered in Literature, Science, and Technology and led to the degrees of Bachelor of Science, Civil Engineer, Mechanical Engineer, and Mining Engineer. The School was among the first to accept women for degree candidacy in engineering.

In 1903 the Corcoran Scientific School, the School of Graduate Studies, and the Columbian College were merged into a single Department of Arts and Sciences. Engineering degrees were made graduate.

Administrative changes led to The Washington College of Engineering being initiated in 1905 as one of the several semi-independent undergraduate colleges of the University, each with its own Board of Trustees. The College provided instruction leading to undergraduate degrees in engineering and architecture.

In 1909 the name of the College was changed to the College of Engineering and Mechanic Arts, and the curricula were revised to give the student a thorough understanding of the theory underlying engineering practice. Emphasis was placed on the development of a knowledge of scientific principles upon which the student could build and by which he might solve new problems as they are met in practice.

The name of the School was changed again in 1914 to the College of Engineering and later to the School of Engineering. Architecture was dropped from the curriculum, and degrees were limited to the field of engineering. However, the primary emphasis upon principles rather than technology which had characterized the School since 1903 was continued and has remained to this day as one of the important distinguishing features of the School.

In 1962 the name of the School became the School of Engineering and Applied Science.

ACADEMIC STATUS

The George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools.

The University is on the approved list of the American Association of University Women and is a member of the College Entrance Examination Board.

The curricula in Civil Engineering, Electrical Engineering, and Mechanical Engineering are accredited by the Engineers' Council for Professional Development.

Undergraduate Study

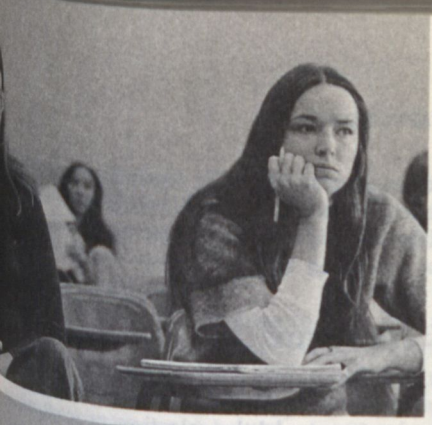
THE UNDERGRADUATE PROGRAM is intended to provide a solid foundation in the basic principles, concepts, and techniques underlying engineering and applied science, on which the individual may build technical competence in a variety of areas as his professional career develops. It is preparation for a career in engineering or applied science, as it exists today and as it may develop in the future.

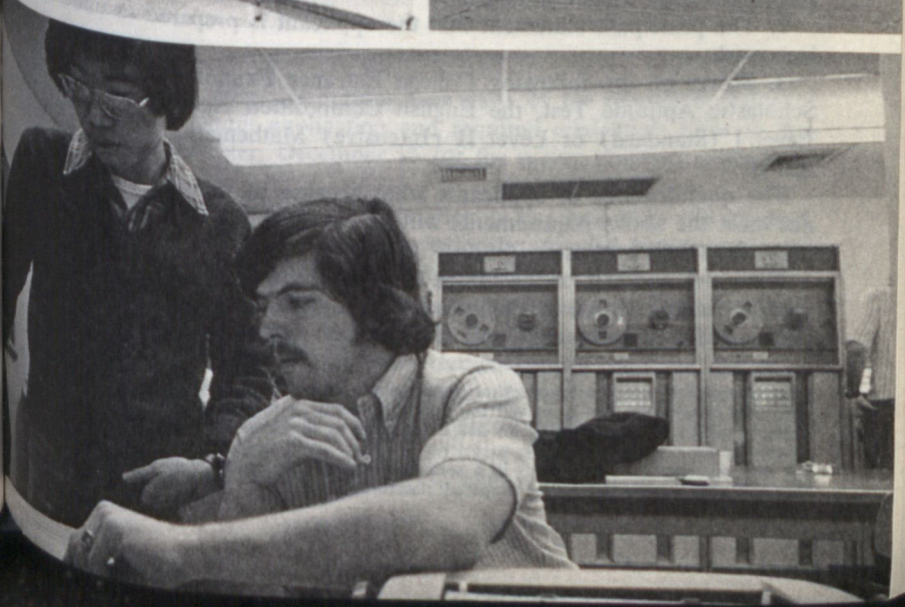
Undergraduate study is the formal beginning of a life-long continuing program of education. The School provides an environment that encourages and fosters the attitudes and disciplines essential to professional growth. The graduate, when he receives his Bachelor's degree, is prepared for productive work in his chosen field; he is also prepared for further development and progress, both formal and informal. The undergraduate curricula include courses in the humanities and social sciences to the extent necessary to develop a reasonable understanding and appreciation of these areas of knowledge.

Admission to the engineering program indicates that the student possesses at least minimum preparation and the probable capacity to meet the academic demands of this School. Since the School cannot predict either the student's response to the demands made on him or the program he should follow for his most effective development, the undergraduate program has been designed to offer a variety of experiences through which the student may find his own best path to maturity and growth in educational development.

The School is a place for learning; for experiencing adventures of the mind and of the hands; for the formulation, exchange, and exploration of ideas. During his undergraduate years the student is led to strengthen his skills in analysis and his talent for creative activity, through liberal use of project-type laboratory work. Independent thought and original ideas receive higher evaluation in the appraisal of student achievements, than the rote recital of information.

To provide the undergraduate engineering student with the opportunity to obtain an enduring foundation in engineering education by combining academic learning with relevant, real-world employment which provides practical, first-hand experience in his chosen field of engineering, the School of Engineering and Applied Science has a Cooperative Education Program in Engineering in which arrangements have been made with leading industrial and governmental organizations for student employment at prevailing salary rates. Every effort is made to place the student in positions of employment that provide the best possible engineering experience consistent with his career plans. These work periods provide the student with income that may enable him to finance the





major portion of his tuition and other expenses. Entering freshmen, as well as transfer students from community colleges whose completed work is equivalent to requirements in this program, can be admitted to the Cooperative Education Program in Engineering.

ADMISSION TO UNDERGRADUATE STUDY

The School admits those applicants who can benefit themselves and society by disciplined intellectual effort in its environment. In the selection process, there is no discrimination because of sex, race, color, religion, or national origin.

Admission is the first selective step in a long series of qualifying steps the student will take in his progress toward professional competence in engineering, and indicates the School's belief that the applicant has at least the minimum preparation and ability to complete the curriculum successfully.

The applicant must be of good character and must have an academic background appropriate for the program of studies contemplated.

APPLICATION FOR ADMISSION

An applicant for admission obtains from the Office of Admissions of the University an application blank which he must fill out completely and return with the $10* application fee.

STUDENTS FROM U. S. INSTITUTIONS

Records presented become the property of the University and *cannot* be returned.

FRESHMAN ADMISSION

Consideration for admission is based on the following:

1. An acceptable certificate of graduation from an accredited high school showing at least fifteen units†;

2. The principal's statement that the applicant is prepared to undertake college work;

3. Scores on the following College Entrance Examination Board tests: the Scholastic Aptitude Test, the English Composition Achievement Test, and Level I (Standard) or Level II (Intensive) Mathematics Test—Level I preferred.

The qualifications of applicants who, because of unusual circumstances, do not meet the above requirements will be considered by the School, which may prescribe admission tests.

Nine and one-half of the fifteen units required for entrance must be distributed as follows: three in English, two in algebra, one in plane geometry, one-half in plane trigonometry, one in physics or chemistry, and two in one foreign

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* Application fee must be by check or postal money order, payable to George Washington University. The application fee is waived for a student applying for readmission who was registered in a degree program at the time of his last registration at this University and has not since registered at another institution.

† A unit represents a year's study in a secondary school subject, including in the aggregate not less than 120 sixty-minute periods of prepared classroom work.

language or history. General science may *not* be counted in satisfaction of the science requirement but may be counted as an elective unit.

It is recommended that *both* physics and chemistry be studied in high school. A high school course in solid geometry is recommended as a firm foundation for college mathematics.

An applicant must arrange to have sent directly *from his school to the Office of Admissions* the academic record of his first seven terms in secondary school, together with a personal evaluation and recommendation from his principal. This information may be supplied on a form provided by the University or on a standard form used by the secondary school provided all essential information is included.

Quantitative Deficiency.—A graduate of an approved high school who lacks not more than two units of the required subjects and who presents fifteen acceptable units may be admitted to a prescribed program which includes courses to make up his deficiencies.

Applicants who wish to begin study in the fall semester should formulate plans early in the senior high school year. Although the University prefers to have applications submitted during the fall semester of the senior high school year, applications may be submitted until March 1. Students graduating at midterm wishing to begin study in the spring semester *should* apply no later than December 1. Applications and all required credentials of students wishing to begin study in either the first or second term of the summer session must be received prior to March 1.

Although decisions on most applications for the fall semester will require submission of seventh-term grades and senior-year test scores, an earlier decision will be given after September 1 to a student whose application becomes complete with a secondary school record through the junior year and junior-year test scores, provided these records clearly establish admissibility.

Early Admission Plan.—Unusually well-prepared students who have completed the junior year in high school may be considered for admission if they submit special credentials and have the unqualified recommendation of their principal or counselor. Inquiries should specifically mention the Early Admission Plan.

TRANSFER STUDENTS

Transfer students from other institutions (see page 21 for minimum residence requirement) should submit application and required credentials prior to August 15 for the fall semester, December 15 for the spring semester, May 1 for the summer sessions.

The transfer student must be in good standing as to scholarship and conduct. He must be eligible to return to the last previously attended institution in the semester for which he seeks admission to this University.

An applicant who has attended one or more institutions of higher learning must request *each* registrar to mail directly *to the Office of Admissions of the University* a transcript of his record, *even though credits were not earned.*

If high school units are not shown on the college transcript and if an applicant has fewer than 30 semester hours of acceptable work (*C* or better on academic work from an accredited institution), he must request that his high school record and College Examination Board Test scores be sent to the Office of

Admissions. Applicants with "marginal records" of 30 semester hours or more of work are requested to submit high school records and the College Entrance Examination Board Test scores.

STUDENTS FROM FOREIGN INSTITUTIONS

Application, required records, and scores on the *Test of English as a Foreign Language* (see below) must be received from all *foreign applicants* no later than March 1 for the fall semester and November 1 for the spring semester.

REQUIRED RECORDS

Applicants must request all educational institutions attended to send directly to the Office of Admissions of the University official credentials listing subjects studied, grades received, examinations taken, and degrees received. Certified copies of diplomas and certificates from secondary schools and all colleges and universities attended are required. Records of state examinations and certificates are also needed. All records become the property of the University and *cannot* be returned.

LANGUAGE TEST

Students whose native tongue is not English are required to take the *Test of English as a Foreign Language*. Students are responsible for making arrangements for taking the test and should address inquiries to: TOEFL, Educational Testing Service, Princeton, New Jersey 08540, U.S.A. The completed application form should be returned to the Testing Service at Princeton well in advance of the beginning of the semester for which the applicant seeks admission. The test fee, which should be remitted with the application, entitles the student to have his test score sent to three different institutions. Registration for the *Test of English as a Foreign Language* does not constitute application for admission to George Washington University

The Bulletin of Information, obtainable without charge, contains a description of the test as well as rules regarding application, fees, reports, and the conduct of the test; lists of examination centers; examination dates; and application blank. On the application for the test, the student should specify that the scores be sent to the Office of Admissions, George Washington University, Washington, D.C. 20006.

If additional tests are prescribed, necessary instructions will be sent to the applicant by the Office of Admissions.

READMISSION

A student previously registered in the University who was not registered on campus during the immediately preceding semester must apply for readmission. Final dates for applying are the same as those for "Transfer Students," see pages 15–16. If the student applies for a degree program and was previously registered as a nondegree student, or if he has attended one or more higher institutions during his absence from the University, he must have complete, official transcripts sent to the Office of Admissions from each institution attended before his application will be considered. Applications for readmission are considered on the basis of regulations currently effective.

The application fee is waived for a student applying for readmission who was registered in a degree program at the time of his last registration at this University and who has not registered at another institution since his last registration at this University.

TUITION DEPOSIT

Upon notification of acceptance, a $100 tuition deposit will be required of all full-time students including those readmitted. The deposit is credited toward tuition and is not refundable.

ADVANCED STANDING

CREDIT FOR ADVANCED PLACEMENT EXAMINATIONS

Advanced standing may be granted for study at the collegiate level in advanced courses in an approved secondary school, if substantiated by satisfactory performance in the appropriate Advanced Placement Examination of the College Entrance Examination Board. Advanced standing may also be granted as a result of satisfactory performance in the College-Level Examination Program (CLEP). Arrangement for the examinations is the responsibility of the applicant and should be made with the College Board, Advanced Placement Examinations, Educational Testing Service, 20 Nassau Street, Princeton, N.J. 08540 or 1947 Center Street, Berkeley, Calif. 94707.

The applicant must request the examining service to submit the test papers and scores to the Office of Admissions. Consideration is given to both the quality of performance on the examination and the quality and content of the course of study completed by the applicant. Credit may be withheld pending satisfactory completion of higher-level courses in the same field.

Total credit that may be so granted is up to 30 semester hours, not more than 8 semester hours of which may be in any one examination area.

CREDIT FROM HIGHER INSTITUTIONS

Advanced standing (see page 21 for minimum residence requirement) may be granted for work successfully completed at an accredited institution of higher learning. Credit will be granted for transferred work only when it meets the requirements for the degree sought at this University. Only work of passing grade (C or higher) will be considered for transfer.

CREDIT FROM TECHNICAL INSTITUTES

Advanced standing may be granted for work successfully completed at technical institutes. Credit will be granted for transferred work only when the applicant passes successfully the required validation examination. Arrangement for the examination should be made with the appropriate Department of the school. In any event, no more than 30 semester hours of credit for technical work will be granted in transfer for those who graduated from a two-year technical institute. A maximum of 60 semester hours of credit for technical work may be granted in transfer for those who graduated from a four-year technical institute.

SERVICE SCHOOL CREDIT

A limited amount of credit earned in service schools since 1941 may be considered for assignment to qualified degree candidates in the School of Engineering and Applied Science. Veterans should submit to the Office of Admissions photostatic copies of their service school records, indicating courses successfully completed with sufficient identification of the course to locate it in the *Guide to Evaluation of Educational Experience in the Armed Forces.*

CREDIT EARNED THROUGH UNITED STATES ARMED FORCES INSTITUTE (USAFI)

Credit is assigned for approved United States Armed Forces Institute college-level examinations passed with satisfactory scores.

REGULATIONS

Regulations regarding REGISTRATION, FEES AND FINANCES *are stated on pages 135–41; other University regulations, on pages 145–50.*

ATTENDANCE

A student may not attend classes until registration is completed and fees due are paid. He may attend only those classes for which he is registered. Regular attendance is required. A student may be dropped from any course for undue absence.

A student suspended for any reason may not attend classes during the period of suspension.

The student is expected to attend every meeting of the course in which he is registered, fully prepared to carry on the work required. The student is held responsible for all work in the course, and all absences must be excused before provision will be made for him to make up the work missed. Excuses for absences from examinations which have been announced in advance can be obtained only by written application to the instructor in charge of the course.

ACADEMIC WORK LOAD

A full-time undergraduate student who is not on probation may register for no more than 20 semester hours. A student employed more than 24 hours a week who is not on probation may take no more than 10 semester hours. In exceptional cases these limits may be exceeded with the Dean's permission.

A student previously unemployed who accepts employment after registration must immediately report that fact to the Dean so that his schedule may be adjusted if necessary.

ADVISORY SYSTEM

The School of Engineering and Applied Science encourages a close faculty-student relationship. Every entering undergraduate student is assigned a permanent faculty adviser to assist him in orienting himself in the professional discipline. Faculty advisers counsel students on their programs of study, the achievement and maintenance of satisfactory scholastic performances, profes-

sional development, and extracurricular activity as part of the educational process. The adviser represents the student in all cases requiring faculty action.

Students must obtain their advisers' approval of programs of study prior to registration. Until a student has completed the work required for the degree he must consult his adviser in all academic matters. However, an adviser may not deny a student entry into any course or activity to which he is entitled under the regulations of the School.

All students are encouraged to discuss college problems with their advisers or instructors at any time; and parents or guardians are invited to consult with the Dean, Department Chairman, and advisers concerning any student problems.

Faculty advisers discharge their counseling duties in accordance with the high principles of their professional responsibility; however, the final responsibility for a student's action lies wholly with the student.

SCHOLARSHIP

For scholarship requirements for graduation, see "Graduation Requirements," page 21.

Grades.—Grades are mailed to the student through the Office of the Registrar at the close of each semester.

The following grading systems is used: *A*, Excellent; *B*, Good; *C*, Average; *D*, Passing; *F*, Failing. Whenever a grade has not been assigned, the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) is recorded.

At the option of the instructor, the grade of *I* (Incomplete) may be recorded if a student, for reasons beyond his control, is unable to complete the work of the course, and if the instructor is informed of, and approves, such reasons. The reasons must be presented to the instructor before the last day of classes for the semester in which the course is given. The grade may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course which is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented to the instructor, he may initiate an appropriate grade change. Although the grade of *I may* remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work (usually the final examination or required paper) must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An *I* cannot be made up after the lapse of one calendar year except by written permission of the Dean's Council.

Quality-point Index.—Scholastic standing is computed in terms of the quality-point index obtained by dividing the number of quality points by the number of semester hours for which the student registered.

Quality points are computed from grades as follows: *A*, four points; *B*, three points; *C*, two points; *D*, one point; *F*, no points, for each semester hour for which the student registered. Courses marked *W* or *I* are not considered in determining the index, except that courses marked *I* will be considered when a formal grade is recorded. Grades in courses at another institution are not considered in computing the quality-point index.

Mid-semester Warning.—At the end of the seventh week of each semester, instructors report to the Dean the names of students whose scholarship is un-

satisfactory. On receipt of a warning notice the student must consult his in-
structor and his adviser immediately.

The advisor may prescribe diagnostic tests and/or remedial study to be com-
pleted before the end of the current semester.

Probation.—A full-time student (one taking 12 semester hours or more)
whose quality-point index based on all courses attempted in his most recent
semester falls below 2.00 for that semester, or who receives two grades of
more of *F* in one semester, will be placed on probation. A student enrolled for
less than 12 semester hours during the fall or spring semester and a student en-
rolled during the summer sessions is subject to probation or suspension on the
basis of his record for 12 semester hours, rather than on his record in any one
semester. The probation period is for one semester for full-time students, or
the next 12 semester hours of study for part-time students.

If a student earns a quality-point index of at least 2.00 in all courses taken
during the period of probation and receives no grade of *F* during this period,
he is removed from probational status.

If a student fails to achieve a quality-point index of 2.00 for all courses com-
pleted during the probation period, he is continued on probation for an addi-
tional period of one semester or 12 semester hours of study.

Upon being placed on probation, a student must undertake the Engineering
Student Probation Program of testing, counseling, and remedial work available
at the Counseling Center. A student on probation is required to follow a
program of study prescribed by his adviser and Department Chairman, and is
not eligible to participate in student activities.

Suspension.—If a student receives two or more grades of *F* during a pro-
bation period he will be suspended. If a student fails to achieve a quality-point
index of 2.00 in a second consecutive period of probation, he will be suspended.
A student who has been on probation for three periods and who fails to achieve
a quality-point index of 2.00 in the third period or any subsequent semester
will be suspended.

DEAN'S HONORS LIST

The Faculty of the School recognizes meritorious scholastic achievement by a
Dean's Honors List, containing the names of candidates for undergraduate de-
grees whose scholastic achievement satisfies all of the following requirements:

1. The student must have completed a minimum of 13 semester hours in
one semester with a quality-point index of 3.00 or higher and with no more
than one grade of *C*.
2. No grade below *C* may have been received during the qualifying period.
3. No disciplinary action may have been taken with respect to the student.

The Dean's Honors List is prepared at the end of the fall and spring semes-
ters and displayed in an appropriate public place in the School. A notation is
made on the student's record each time his name is included in the List.

USE OF CORRECT ENGLISH

Any student whose written or spoken English in any course is unsatisfactory
may be reported by the instructor to the Dean. The Dean may assign supple-
mentary work, without academic credit, varying in amount with the needs of
the student. If the work prescribed is equivalent to a course, the regular tui-

tion fee is charged. The granting of a degree may be delayed for failure to make up any such deficiency in English to the satisfaction of the Dean.

GRADUATION REQUIREMENTS

See page 148 for general requirements for graduation.

RESIDENCE

A minimum of 30 semester hours must be completed in residence. Summer work may be counted. Unless special permission is granted by the Dean to study elsewhere, the work of the final year must be completed in residence.

SCHOLARSHIP

To be eligible for graduation a student must have a quality-point index of at least 2.20 in those technical courses specified in the fifth through the eighth semester of his curriculum.

HONORS

With Distinction.—A Bachelor's degree may be conferred "With Distinction," at the discretion of the Faculty, if a student attains a quality-point index of 3.50 or higher on all work taken at this institution. To be eligible for this honor a student must have completed at this institution at least one-half of the work required for the degree.

Special Honors.—A Bachelor's degree may be conferred with "Special Honors," at the discretion of the Faculty, for outstanding achievement in the student's senior year work on recommendation of the Faculty, under the following regulations:

1. The student must have his candidacy for Special Honors approved by the department chairman representing his major field not later than the beginning of his senior year.
2. The student must meet such other conditions as may be set at the time his candidacy is approved.
3. No student will be awarded Special Honors unless he has a quality-point index of at least 3.00 on all work taken at this institution.
4. To be eligible for Special Honors a student must have completed at this institution at least one-half of the work required for the degree.

UNDERGRADUATE CURRICULA

The four-year undergraduate curricula lead to the degree of Bachelor of Science, with parenthetic designation of the major; for example, Bachelor of Science (Electrical Engineering). Students who are deficient in preparation require a longer period; those who are admitted with advanced standing or who attend summer sessions can complete the requirements in less time.

The program of the first four semesters (2 years) is common to all curricula and provides the essential broad base of scientific principles and mathematical techniques necessary for the professional courses of the last four semes-

ters, together with an appropriate background in the humanities and social sciences (see below).

A minimum total of 130 semester hours is required to qualify for the degree. However, students are encouraged to elect additional course work above the required minimum to the extent that their interests and the School's offerings permit.

Degrees are offered in Civil Engineering, Electrical Engineering, and Mechanical Engineering, and each field provides an area of concentration in Computer Science. Students in Civil Engineering may also select an area of concentration in Environmental Civil Engineering.

The student is assisted by his faculty adviser, who approves his program each semester prior to registration. For the guidance of the student and his adviser, every beginning student takes the School's placement examinations in English, reading, algebra, and trigonometry and, if deficient in any of these areas, must take remedial work in the area of deficiency.

COURSES IN THE HUMANITIES AND SOCIAL SCIENCES

The basic purpose of a program in the humanities and social sciences for engineering students is to assist the student in acquiring knowledge which will permit him to understand the social and humanistic elements of the past and present and to analyze the problems facing his society today. The ultimate goal is to help the engineer have a better understanding of his society and an appreciation of his role and responsibilities within it.

Since the education of an engineering student is, by necessity, oriented toward technical subjects, his program in the humanities and social sciences should not emphasize technical aspects and skills, but should rather consist of courses which can broaden his outlook. As a consequence, courses in subjects such as accounting, finance, industrial management, introductory languages, and personnel administration should not be included in the humanities and social sciences program. On the other hand, courses in areas such as anthropology, economics, fine arts, geography, history, literature, philosophy, political science, psychology, and sociology are considered appropriate.

Each engineering student is required to prepare, with the assistance of his faculty adviser, a program of courses in the humanities and social sciences explaining how his program meets the purpose stated above. The student's program must include a minimum of 18 semester hours and must be approved by both his adviser and department chairman.

Graduate Study

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE offers graduate study leading to the degrees of Master of Science, Master of Engineering Administration, and Doctor of Science.

In its graduate programs, the School, as it does in undergraduate study, adheres to the educational philosophy of increasing the knowledge and understanding of the individual student by concentration on principles and their application rather than by encyclopedic coverage of techniques and specialties.

detail. Each program is individually planned according to the student's prepa-
ration and needs.

Graduate study may be undertaken in any field of engineering or applied
science in which the School has adequate facilities and resources. Upon ap-
proval, the student may select courses in other departments of instruction in
the University in order to serve specific needs or objectives. A complete list of
available fields and areas of concentration is included under each departmental
listing in the "Programs of Study and Courses of Instruction" section of this
catalogue (pages 42–134).

THE MASTER'S PROGRAMS

The student's program may provide for broad coverage in a variety of fields
or may be designed to provide a concentration in particular areas. The mini-
mum program consists of 24 semester hours of approved graduate courses and
a Master's thesis (equivalent to 6 semester hours). With the approval of the
department the student may elect an optional program without a thesis which
consists of a minimum of 33 semester hours of approved graduate courses. All
Master's candidates are required to pass a Master's Comprehensive Examina-
tion. Students whose undergraduate study does not include necessary prerequi-
sites may be required to take more than the minimum semester hours required.

Upon admission the student is assigned an adviser. Programs of study are
determined by any prerequisites established and the requirements of the depart-
ment in which the student wishes to study. The program of studies in prepara-
tion for the Master's Comprehensive Examination must be approved by the
student's adviser and the appropriate department chairman.

DMISSION

dmission to graduate study toward a Master's degree requires an appropriate
achelor's degree from a recognized institution and evidence of capacity for
roductive work in the field selected, as indicated by undergraduate grades,
raduate Record Examination scores, and similar data.

An applicant who has significant deficiencies in preparation may be required
take prescribed undergraduate courses as an unclassified student before
ing admitted to graduate student status. In some cases, if such deficiencies
e minimal, he may be admitted to graduate student status and allowed to
ke a limited number of graduate courses while completing the undergraduate
urses in which he is deficient. In no case may the undergraduate courses
us taken fulfill any part of the requirements for the Master's degree.

For additional admissions requirements for the degrees of Master of Engi-
ering Administration and Master of Science in the Department of Engineer-
g Administration, see pages 116, 119; for the degree of Master of Science in
e Department of Operations Research, see page 126. Candidates for the de-
ee of Master of Science in the Department of Electrical Engineering and
omputer Science must have satisfied specific undergraduate requirements,
epending upon the area of concentration. Students should consult the special
chure *The Graduate Programs of the Department of Electrical Engineering*
d *Computer Science*.

ADMISSION PROCEDURE

Forms for application for admission are available at the School of Engineering and Applied Science. They must be submitted, together with the nonrefundable application fee of $25, to the Director of Engineering Admissions, Room 100, Tompkins Hall of Engineering, George Washington University, Washington, D.C. 20006, no later than September 1 for the fall semester, December 15 for the spring semester, May 1 for the first summer session, and June 1 for the second summer session. The applicant must request each educational institution attended since high school graduation to send an official transcript of his record directly to the Director of Engineering Admissions. If the applicant has completed the Graduate Record Examination, he should request that his scores be sent to the School. The applicant will be notified by mail when a decision on his admission has been made. Foreign students are required to take the *Test of English as a Foreign Language* (see page 16).

All inquiries and correspondence relative to graduate admission should be directed to the Director of Engineering Admissions.

TRANSFER CREDIT

Up to 6 semester hours of satisfactory credit (with grades of *A* or *B*), which normally must have been earned in a graduate program at another recognized institution, *may* be accepted in transfer, when applicable, to satisfy Master's degree requirements in this School. However, the student must, with the approval of his adviser, petition to the appropriate department chairman for such a transfer.

REGISTRATION

A graduate student may register for classes when he presents an official letter of admission or his student identification card from the previous semester. No registration is accepted for less than a semester or one summer session.

Concurrent registration in this School and in another institution not a member of the Consortium of Universities of the Washington Metropolitan Area, Inc., or another division of this University requires the written permission of the Deans concerned, *prior to registration*. Allowance of credit for work done concurrently at another institution is at the discretion of the Dean.

Dates and hours of registration are stated in the Calendar, page 4, and in the *Schedule of Classes* published in advance of each semester.

MASTER'S THESIS

In those programs requiring a thesis, the degree candidate must submit an acceptable thesis to demonstrate his ability to make independent use of the knowledge and discipline of thought acquired and developed by graduate study, to furnish objective evidence of constructive power in a given field, and to demonstrate that he can communicate the results of his work in writing. Work of a suitable character for which the student has professional responsibility may be considered, whether done on or off campus, provided no significant amount of work is completed without faculty supervision.

As a part of registration for the thesis course 299, the candidate must submit to the appropriate department chairman (on the form obtainable at the School office) his thesis area, approved by his faculty adviser. He must submit his

thesis title to the Dean, on the form available in the School office, at the beginning of the semester in which he expects to graduate. Registration in thesis 299–300 entitles the student, during such registration, to the advice of the member of the faculty under whom the thesis is to be written. He may consult his adviser, but the thesis is the exclusive responsibility of the student.

The thesis in final form must be submitted to the appropriate department chairman by the date stated in the calendar for the semester in which the candidate enrolls in thesis 300. In case a thesis is unfinished on the date specified, the student will be granted an additional semester and must pay the "Continuous Registration" fee (see page 138) unless he is registered for course work. If the preparation of the thesis extends beyond the three semesters, approval for an extension of time will be required and the student must reregister for thesis 300 and pay tuition as for a repeated course. The over-all time limit for earning the degree (see pages 26–27) may not be exceeded.

A thesis may be submitted in final form one time. The acceptability of the thesis is determined exclusively by the Master's Comprehensive Examination committee. If the thesis is unacceptable, the student's graduate status is terminated.

Printed copies of detailed regulations regarding the form and reproduction of the thesis are available in the Office of the School. Accepted theses, with accompanying drawings, become the property of the University and are deposited in the University Library, where the duplicate copies are bound and made available for circulation.

OPTIONAL MASTER'S PROGRAM WITHOUT A THESIS

With the approval of the department, a student may elect an optional program without a thesis which consists of a minimum of 33 semester hours of approved graduate courses.

MASTER'S COMPREHENSIVE EXAMINATION

After completing his prescribed program, the candidate must pass a Master's Comprehensive Examination, to demonstrate substantial understanding of principles and method and their use in the area of his interest. This Examination may be written, oral, or both. A graduate student who fails any portion of the Master's Comprehensive Examination on his first attempt may be examined one more time if approval is given by the appropriate Examining Committee. In the event of failure to complete the Examination satisfactorily, the student's graduate status terminates.

REGULATIONS

Regulations regarding REGISTRATION, FEES AND FINANCES *are stated on pages 135–41; other University regulations, on pages 145–50.*

ATTENDANCE

A student may not attend classes until registration is completed and fees due are paid. He may attend only those classes for which he is registered. A student is expected to attend every meeting of the course in which he is registered, fully prepared to carry on the work required. A student may be dropped

from any course for undue absence. Excused absences must be arranged with the instructor.

SCHOLARSHIP

Grades are indicated as *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; and *CR*, Credit for satisfactory thesis completion. Whenever a grade is not assigned, the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) is recorded.

At the option of the instructor, the grade of *I* may be recorded if a student, for reasons beyond his control, is unable to complete the work of the course, and if the instructor is informed of, and approves, such reasons before the date when grades must be reported. The grade may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course which is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented to the instructor, he may initiate an appropriate grade change. Although the grade of *I* *may* remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An incomplete which is not removed within one calendar year is automatically changed to an *F*.

A student may not repeat for credit a course in which he has received a grade of *C* or above, unless required to do so by the department concerned. A written statement requiring the student to repeat such a course for credit must be submitted to the Registrar by the appropriate department chairman.

For Master's work, a minimum of 24 semester hours (for those who receive credit for a thesis) or 33 semester hours (for those who follow the program without a thesis) of graduate course work with the grade of *B* or higher is required for graduation. Students who receive two grades of *F*, or (except those registered prior to and in continuous residence since the 1967 fall semester) three grades below *B*, are barred from further enrollment in graduate courses and, ordinarily, will not be readmitted to gradute study. Students who receive the grade of *C* in one or two courses are required to take additional course work to make up the minimum semester hours of work with grades of *B* (except those registered prior to and in continuous residence since the 1967 fall semester).

RESIDENCE

In general, a minimum of one year of full-time study, or the equivalent in part-time study, must be completed in the School.

TIME TO COMPLETE MASTER'S DEGREE REQUIREMENTS

A full-time student in the Master's program is allowed a maximum of three calendar years to complete all degree requirements, from the date of his first graduate-student status registration in prerequisite or graduate courses. A part-time student in the Master's program is allowed a maximum of five calendar years. The time limit does not include any period of registration as an unclassified student before admission to graduate student status, nor does it

encompass any specified period spent on approved leave of absence. Readmission is required upon expiration of leave of absence under the conditions and requirements then prevailing.

Students who do not complete degree requirements within the allowed time have their graduate status terminated. They may be readmitted to graduate status under conditions specified by the department chairman and approved by the Dean.

THE DOCTORAL PROGRAM

The School of Engineering and Applied Science offers a program of advanced study and research leading to the degree of Doctor of Science. This program is limited to those fields in engineering or applied science in which a discipline has been established and for which the University has or can arrange adequate resources.

The doctoral program is designed to prepare the student for a career of creative scholarship by providing a broad but balanced background of knowledge and guidance in the performance of research. It requires study of interrelated fields of learning as well as original research in the field of central interest.

The program for the degree is divided into two stages. The first—made up of a study of interrelated fields of learning which supports the general area of research concentration—culminates in the qualifying examination. The second —composed of research investigation of a particular subject in a special field and the presentation of such research findings in a written dissertation—culminates in the final examination.

ADMISSION TO DOCTORAL STUDY

A satisfactory Master's degree from an accredited institution is required, together with acceptable personal qualities and a capacity for creative scholarship. Normally, a *B* average in graduate work is required. However, the minimum does not assure automatic acceptance; the departments may, and often do, set higher admission standards.

APPLICATION FOR ADMISSION

The prospective doctoral student seeking admission should apply before June 1 for the fall semester and before December 1 for the spring semester. Personal interviews may then be arranged to discuss the applicant's qualifications and the possibilities for an effective doctoral program. The applicant must arrange for complete documentary records (transcripts) to be forwarded to the Director of Engineering Admissions in sufficient time to permit assembly of complete records for evaluation as soon after the above application deadlines as possible.

The applicant must arrange for letters of recommendation to be submitted from two faculty members of the institution from which he received his Master's degree; one of these, if possible, should be from his Master's adviser. The letters should be addressed to the appropriate department chairman.

LANGUAGE REQUIREMENT

A doctoral student should maintain a broad outlook as he pursues his study, and therefore must have the capability of reading appropriate literature pub-

lished in a foreign language. Accordingly, a reading knowledge of one foreign language, preferably Russian, must be demonstrated before admission to the qualifying examination. If the student wishes to satisfy this requirement with a language other than Russian, he must obtain the approval first of his doctoral adviser, then of his department chairman; permission to use a language other than Russian will be granted on the basis of its importance to the student's field of interest.

TOOL REQUIREMENT

In addition to the language requirement, an examination in a tool requirement (e.g., computer programming) may be established by the various departments.

STUDY FOR THE QUALIFYING EXAMINATION

Upon admission to the first stage of the program, i.e., study of interrelated fields culminating in the qualifying examination, the student is assigned a faculty adviser who directs his studies.* The adviser approves appropriate fields of study to insure the student's breadth of knowledge and to support research in his central field of interest, advises him concerning the scope and content of his fields of study, and guides him in preparing for the qualifying examination. Programs of study are normally structured to include a major field of study and two minor or supporting fields.

A minimum of 30 semester hours of credit in a formal program at the graduate level beyond Master's study is required. In many cases, particularly in those in which the student undertakes a doctoral program in a field other than that in which he obtained his Master's Degree, the program of studies exceeds 30 semester hours.

Students admitted to doctoral study are encouraged to undertake one year of full-time study on campus. In general, the adviser will require the student to register for a minimum of 6 semester hours of course work in every semester except the summer sessions.

TRANSFER OF CREDIT

Up to 6 semester hours of credit earned in courses completed with the grade of *A* or *B* while enrolled in a doctoral program at another accredited institution may be accepted in transfer to satisfy doctoral requirements of this School, subject to the approval of the student's adviser and his department chairman. Credit earned in courses completed more than five years prior to admission to the doctoral program will not be accepted in transfer, and some departments may require that transfer credit must have been earned within a shorter period of time before admission.

THE QUALIFYING EXAMINATION†

The purpose of the qualifying examination is to ascertain that the student's breadth of background and intellectual development are adequate to support doctoral research in his central field. Qualifying examinations may be written

* In some departments, instead of a faculty adviser, a faculty committee may be appointed to approve programs, direct study, and carry out all other responsibilities of the faculty adviser.
† Some departments may administer a pre-qualifying examination prior to completion of the study program.

or oral, or both, and are scheduled over a period of several days. They are conducted only during the fall and spring semesters on dates established by the departments and are administered by a faculty committee. Upon favorable report of the examiners to the Dean through the appropriate department chairman, the student is admitted to candidacy for the degree; he then begins his specialized study and research under the supervision of a designated member of the faculty or, in special instances, an outstanding engineer/scientist who is not a member of the faculty.

The qualifying examination is the principal means used to determine the student's ability to qualify as a candidate for the doctoral degree and to enter the second stage of his program.

At the discretion of the committee which prepared the examination, the doctoral student may be given a second opportunity to qualify for candidacy in the event of failure in any part of the qualifying examination. In general, the entire qualifying examination must be retaken by the student in order to qualify for candidacy.

SCHOLARSHIP

To be admitted to the qualifying examination, the doctoral student must achieve an over-all academic average of 3.20 on a scale of 4 (a grade of *A* equals 4 points; *B*, 3 points; *C*, 2 points; and *F*, 0 points). No doctoral student may receive more than two course grades below *B*. If he does receive more than two course grades below *B*, his graduate study is terminated and his further enrollment prohibited. Courses in which the student earns grades below *B* are not included in his total semester-hour requirement for the degree. In the event a student receives any grade below *B*, he is required to consult with his adviser for a review of his program of study and discussion of possible changes therein.

RESEARCH, DISSERTATION, FINAL EXAMINATION

The student admitted to candidacy for the degree of Doctor of Science requests a Director of Research the member of the faculty under whom he wishes to conduct his research. The faculty member may accept or reject such request. The research area is approved by the Director and the appropriate department chairman. Throughout the remainder of the doctoral program the candidate works directly under his Director in his dissertation research. However, the student is not precluded from consulting with other members of the faculty, as may be required, on an informal basis, and may be encouraged to do so by his Director of Research. A committee of the faculty consisting of three members including the Director as chairman will assist in supervising the final preparation of the dissertation. The department chairman appoints such a committee on the recommendation of the Director of Research. Work on the dissertation is equivalent to a minimum of 24 semester hours.

THE DISSERTATION

A dissertation is required as evidence of ability to perform original scholarly research and to present and interpret the results. The student is solely responsible for the content of his dissertation.

The aim of the student in this stage of his candidacy is the production of a dissertation which embodies the results of an extended study original in nature

and which includes material deemed worthy of publication in recognized scientific and engineering journals. The student is expected to attempt to publish the results of his research as soon as possible after he receives his degree and to submit copies of the published material to the Dean. Credit must be given in the publication to the fact that the material is abstracted, summarized, developed, etc., from a dissertation submitted to George Washington University in partial fulfillment of the requirements for the Doctor of Science degree.

The candidate must submit to the appropriate department five complete copies of the dissertation and two original copies of an abstract (not to exceed 600 words) of his dissertation no later than the date specified in the calendar. One copy of the abstract is for inclusion in the announcement of the examination and one for reproduction by University Microfilms, Inc. One copy of the dissertation is also sent to University Microfilms, Inc.

Printed copies of detailed regulations regarding the form and reproduction of the dissertation, preparation of the abstract, and services offered by University Microfilms, Inc., are available at the School Office. The successful candidate for the doctorate is required, before receiving his degree, to pay a fee to cover a part of the expense of printing the abstract of his dissertation, and for the basic service rendered by University Microfilms, Inc. Accepted dissertations, with accompanying drawings, become the property of the University and are deposited in the University Library where bound copies are available for circulation.

THE FINAL EXAMINATION

Upon acceptance of the dissertation by the committee, consisting of the Director and two other faculty members of this School, which has assisted in supervising its final preparation, the candidate is presented for his final examination. The final examination is oral and is open to the public. The candidate must demonstrate a mastery of his special fields of study and of the materials and techniques used in the research. The committee of examiners will consist of not less than five members, three of whom must be members of the faculty on full-time service. The committee may include qualified experts brought to the University especially to participate in the examination. The Director of Research serves as Advocate for the candidate. When the candidate satisfies the examining committee of the high quality and originality of his contribution to knowledge as well as his mastery of the scholarship and research techniques of his field, the committee of examiners recommends him for the degree of Doctor of Science. The final examination is conducted only during the fall and spring semesters. The candidate should consult with the appropriate department chairman as to possible dates for the examination.

RESIDENCE AND CONTINUOUS STUDY

All the work for the degree must be done in residence (on the campus), except when special permission is granted by the chairman of the department. The student must maintain continuous registration in the School. Failure to do so breaks the student's registration, and he must apply for readmission to doctoral study under whatever conditions and regulations are in effect at that time. In case of incapacity or other legitimate reasons, the student may be granted a leave of absence of up to one year. Extension of such leave will require special request to and approval of the appropriate department chairman. Dur

approved leave of absence, the student must maintain continuous registration. The time period for completion of all requirements for the degree will be adjusted on the basis of the approved leave of absence.

In general, one year of study is the minimum amount of time to be spent in preparation for the qualifying examination. The qualifying examination must be completed within five years of the date of admission, and the entire degree program must be completed within seven years. After admission the student may apply for his qualifying examination whenever he believes that he is properly prepared. A minimum of two years of full-time study and research should be expected in meeting the requirements for the degree.

Special Programs

INSTITUTE FOR THE STUDY OF FATIGUE, FRACTURE, AND STRUCTURAL RELIABILITY

THE INSTITUTE for the Study of Fatigue, Fracture, and Structural Reliability of the School of Engineering and Applied Science is under the technical direction of Dr. A.M. Freudenthal, an internationally recognized authority. The basic objective of the Institute is to develop an interdisciplinary approach to fatigue research through close cooperation of research workers from different fields. The Institute deals principally with the study of the physical mechanism of damage initiation, in order to establish principles for the rational design of metal alloys of superior fatigue performance on the one hand, and to develop advanced methods of fatigue design and reliability on the other. Because of the large volume, past and current, of straight fatigue testing of standard test specimens in industrial, government, and university laboratories, no testing of this type is generally conducted by the Institute. However, results of such tests appearing in publications and reports are carefully scrutinized for their significance in terms of the purposes of the Institute. In addition to advancing interdisciplinary research, the Institute provides specialized training for graduate students.

The Institute conducts seminars, issues technical reports, and supplies information, lectures, and consultations to many government and industrial research and development laboratories.

INSTITUTE FOR MANAGEMENT SCIENCE AND ENGINEERING

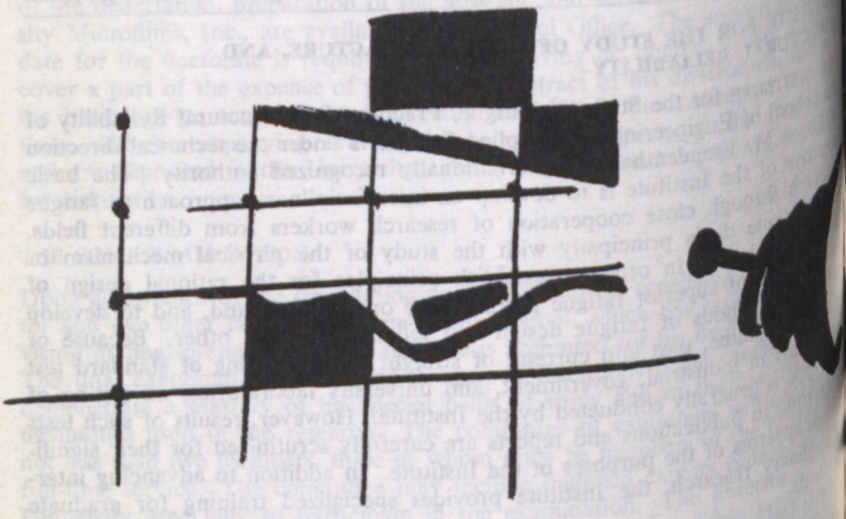
The Institute for Management Science and Engineering defines and develops new management techniques required to keep pace with our ever-expanding technology. It provides a multidisciplinary environment for innovative graduate teaching and substantial opportunities for research activities and public service under diversified sources of external support. The principal academic fields directly involved are operations research, management science, and the computer sciences.

The programs of the Institute are concerned with important educational and public-service needs for conservation of national resources. Such programs require full-time interaction among students, faculty, and staff in ways possible only at universities. The Institute works closely with the University's Program of Policy Studies in Science and Technology in the application of

developing technologies to contemporary problem areas. Through its Program in Logistics, the Institute performs research leading to the development of a science of logistics featuring principles and methodology for resource allocation problems in civil affairs and national defense efforts.

Participation by faculty members and graduate students from all schools in the University is encouraged as consistent with the multidisciplinary objectives of the Institute. Graduate students are supported through research assistantships with thesis and dissertation efforts ordinarily being the major work responsibilities. Reliance is also placed on staff research specialists, and there are special provisions for substantial contributions from "distinguished visitors" from government, private industry, and other universities.

The Institute disseminates its results through seminars, colloquia, conferences, and a special series of monographs. All of the research is unclassified.



THE GWU—NASA-LANGLEY GRADUATE PROGRAM

George Washington University, in cooperation with the National Aeronautics and Space Administration's Langley Research Center, has a full-resident graduate engineering program at NASA-Langley, in Hampton, Virginia, approximately 200 miles south of Washington, D.C.

The program is open to qualified NASA employees and area residents. Courses may also be taken by nondegree students, with the approval of the instructor. Students may be permitted to transfer a maximum of 6 semester hours of approved graduate course credit from other accredited institutions.

Courses in the program are taught by NASA scientists and engineers and the faculty of the School of Engineering and Applied Science. NASA-Langley's extensive scientific and engineering facilities and equipment are utilized whenever feasible.

The program at NASA-Langley leads to the degrees of Master of Science and (by special permission of the appropriate department chairman) Doctor of Science in the fields of acoustics, aerospace engineering (including options in

aeronautics and astronautics), applied mechanics, computer-aided structural design, computer science, electrical engineering, flight sciences, materials engineering, and mechanical engineering.

Information regarding this program may be obtained from John L. Whitesides, Jr., Coordinator, GWU-NASA Program, Mail Stop 211A, NASA-Langley Research Center, Hampton, Virginia 23365.

THE GWU—NASA-LANGLEY JOINT INSTITUTE FOR ACOUSTICS AND FLIGHT SCIENCES (JIAFS)

The National Aeronautics and Space Administration's Langley Research Center joined with George Washington University's School of Engineering and Applied Science in 1971 to create the Joint Institute for Acoustics and Flight Sciences. This jointly operated Institute is dedicated to increasing the nation's research and engineering capabilities in relevant technical fields such as acoustics, flight sciences, and computer-aided structural design. The Institute, which is located at the Langley Research Center, is dedicated to the advanced training of students and professional engineers in the fields of acoustics, flight sciences, and computer-aided structural design, and other relevant areas, and serves to provide a center for advanced research by bringing together researchers and scholars from these fields for the exchange of ideas and findings. It is also the purpose of the Institute to provide the necessary facilities for qualified researchers and scholars who want to engage in research work in these areas.

The organization of the Institute consists of a director, John E. Duberg, Associate Director of the NASA-Langley Research Center, and a co-director,

Harold Liebowitz, Dean of the George Washington University's School of Engineering and Applied Science.

JIAFS currently offers academic and research programs in the areas of Acoustics, Flight Sciences, and Computer-aided Structural Design. The objective of the program is to prepare qualified graduate students for careers in research, development, design, and teaching to meet the challenges of ever-increasing technical problems and the nation's needs in these fields. The education and research opportunities offered in the program combine the academic resources of George Washington University and the professional research resources and facilities of NASA-Langley Research Center. These opportunities also enable students to involve themselves in research projects that excite their interest and permit them to associate with prominent visiting members who are working on related problems. Most of the faculty and NASA scientists conduct research, and students are closely knit into the intimate association of research and instruction from the day of their arrival. It is believed that the experience of the students during their stay at the NASA-Langley Research Center will be highly rewarding and will benefit them throughout their future careers.

The current education and research programs are the following:

Acoustics Program.—The Acoustics program is concerned with the problems of alleviating noise and with providing a technical base for design of acceptable aircraft and space vehicles, noise-resistant structures, and ground transportation systems. Areas of current research interest include boundary-layer noise, duct acoustics, jet noise, nonlinear problems in acoustics, rotor noise, structural response to noise, mechanical and acoustical coupling problems, and subjective response to noise and vibration.

Flight Sciences Program.—The Flight Sciences program deals with advanced flight concepts of both CTOL and V/STOL aircraft, including areas of flight dynamics, instrumentation, guidance and control, aeroelasticity, and systems analysis. Specific research areas that are currently being investigated include aerodynamic analysis of jet-augmented wings, stability and control of V/STOL aircraft, analysis and flow visualization of wing-tip vortices, wind-tunnel and flight testing of V/STOL aircraft, stall-spin characteristics of aircraft, experimental evaluation of aircraft handling characteristics, and ride-quality control of STOL aircraft.

The Computer-aided Structural Design Program.—The Computer-aided Structural Design program is designed to provide a basis and working knowledge of advanced computer applications in interdisciplinary and optimum design of aircraft, areospace, and other structures. Current research topics in this program include improved methods of automated design; efficient and accurate numerical methods for analysis of complex aircraft, aerospace, and other structures; multidisciplinary and integrated design procedures; new algorithms for optimization methods; and interactive graphics.

Participating in these programs are Graduate Student Research Scholar Assistants, faculty from George Washington University and the Institute of Sound and Vibration Research of the University of Southampton, England, scientists and engineers from NASA-Langley, and visiting scientists and engineers.

A number of Research Scholar Assistantships are available to qualified students seeking an outstanding opportunity for graduate study and research leading to the degrees of Master of Science and Doctor of Science in the

fields of Acoustics, Flight Sciences, and Computer-aided Structural Design. Applicants who are awarded Research Scholar Assistantships will receive stipends of up to $6,500 a year for a Master of Science degree and $7,500 a year for the Doctor of Science degree. Applications, a JIAFS brochure, and additional information may be obtained from Professor S.W. Yuan, JIAFS, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20006.

THE GWU—NSRDC GRADUATE PROGRAMS

Off-campus graduate programs are offered in cooperation with the Naval Ship Research and Development Centers, Annapolis and Carderock, Md. Programs of study lead to a Master's degree in the fields of engineering administration, ocean and marine engineering, materials science, or systems science. The programs are open to all qualified applicants in the Annapolis and Carderock areas. Students not seeking a degree may register for courses offered in these programs providing they have the approval of the faculty adviser at the time of registration. For additional information, write to the Director of Engineering Admissions, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20006.

COOPERATIVE EDUCATION PROGRAM IN ENGINEERING

Cooperative education is a process of education which formally integrates the student's academic study with work experience in cooperating employer organizations. The usual plan is for the student to alternate periods of college study with periods of experience in appropriate fields of industry and government. The experience periods are considered an integral part of the student's education. Through the interaction of the study and work experiences, the student enhances his academic knowledge, his personal development, and his professional preparation. The teaching faculty, the coordinators, and the employing supervisors share in the educational process of the cooperative student.

The following factors are adhered to as closely as possible for the student's working experience:

1. The student's employment is related as closely as possible to his field of study and individual interest within his field.
2. The employment is considered to be a regular, continuing, and essential element in the educational process.
3. The working experience will ideally increase in difficulty and responsibility as the student progresses through the academic curriculum. Normally the salary of the student will increase accordingly.

The student's working experience in industry or government gives him the opportunity to meet and work with men and women under varied conditions, to get along with them, learn from them, respect them, and earn their respect. Indeed, these advantages alone could be just as important in shaping a young person's life as the opportunity to obtain experience in a chosen field.

ADVANTAGES OF COOPERATIVE EDUCATION

Combines Theory and Practice.—By coordinating the work experience in industrial and governmental organizations with the campus education program, theory and practice are closely integrated, and students find greater relevance

in their studies. As a result of this alternation between academic and industrial environments, the student tends to understand the role and meaning of each environment, with a deeper appreciation for each.

Helps Finance Educational and Living Expenses.—The student's earnings will contribute substantially to financing his own education and living expenses, leading to independence and contributing significantly to his self-esteem and confidence. As stated earlier, it is expected that as the working experience increases in difficulty and responsibility as the student progresses through the academic curriculum, the salary of the student will increase accordingly.

Serves as a Bridge to the Future.—Cooperative education helps markedly to orient students to the world of work. Most students are genuinely concerned about their future life work. They want to know more about the range of occupations open to them and the potentials and limitations of these fields. They want to know about the qualifications demanded and their own fitness. Through cooperative education programs, students have opportunities for exploring their own abilities in connection with real jobs, and they find a direct means of gaining information and guidance not only in the occupations in which they are employed but in a number of related fields as well. They have a chance to test their own aptitudes more fully than is normally possible on campus.

Increases Motivation to Achieve.—This coordination of work and study increases student motivation. As students see connections between jobs they hold and the things they are learning in school, greater interest in academic work develops. During the work periods there is a tendency for the student to develop good work habits because his efforts as a productive and salaried employee are rated by the employer.

Enhances Human Relationships.—Because the work experiences involve the students in relations with co-workers who come from a variety of backgrounds, and because success in these jobs requires constructive relationships with colleagues, most students in cooperative education develop deeper understanding of other people and greater skills in human relations.

Augments Development of Maturity.—For many students the work experience contributes to an increased sense of responsibility for their own efforts, more dependence on their own judgments, and a corresponding development of maturity. In addition, the student's role as a team member in a real and productive working environment inculcates a seriousness of life and purpose which is often delayed for the traditional college graduate.

RESPONSIBILITIES OF THE COOPERATIVE STUDENT

As a cooperative student working in association with the professionals in his field, the student must adopt professional standards of conduct. He is also a representative of the George Washington University School of Engineering and Applied Science. After each work period the student prepares a report describing his duties and responsibilities at work, and his supervisor sends an appraisal of his work performance to the Cooperative Program Coordinator. These reports are reviewed with the student and become part of his University record.

The cooperative program is a three-way partnership among the student, his employer, and George Washington University. The student's responsibilities extend equally to each of the other two members of the partnership, and the partnership cannot be altered during the program without the knowledge and consent of all.

WHY EMPLOYERS PARTICIPATE IN COOPERATIVE EDUCATION PROGRAMS

Industry and government agencies have found that cooperative students are valuable employees. Generally speaking, they are alert and energetic young people who, stimulated by a definite goal, return more than a day's work for a day's pay. Graduates of the cooperative program represent a good source of well-trained manpower. The training period provides an opportunity for the employer to evaluate the student as a prospective permanent employee. Employers feel that this program is an important part of their effort to attract well-qualified employees. At the same time, the student is able to evaluate the employer in terms of his future plans and interests. About half of the cooperative graduates establish such mutually beneficial relationships with their employers that they remain in permanent employment after graduation, with a substantial head start in their careers.

It is emphasized, however, that neither the student nor the employer is obligated for permanent employment after graduation. Industry and government agencies consider participation in cooperative education as a long-range investment rather than a current expense. As a partner with the University, the employer is engaged in a joint effort to develop young talent more fully, thus assuring better education for the student, improved utilization of the graduate, and greater cooperation with the University.

SCHOLARSHIP REQUIREMENTS

Students entering the program must be in good academic standing and must have completed at least two semesters of academic study prior to their first work assignment. To remain in the program, the student must maintain a passing average and perform satisfactorily for his employer.

LIVING ACCOMMODATIONS

Arrangements will be made for students in the cooperative program to retain their dormitory and dining privileges at the University, if they so desire, during the work periods. During this time, they will also retain full student privileges and have access to all University facilities. Faculty will be available for consultation by appointment.

WORK-STUDY SCHEDULES

At this time, individual schedules are being arranged with the various employers in the Washington area. Since each employer operates differently, special schedules are arranged which are mutually satisfactory to the student, the employer, and the School.

Generally, the student's schedule is arranged with the employer after he has successfully completed the first year of study. Many employers will require the student to work during the summer immediately following the freshman year. The student returns to the School for the sophomore year, working again during the second summer. Beginning with the third year, students alternate between employer and classroom each semester for the next two years, returning to the classroom for the fifth and final year. Schedules for transfer students are arranged on an individual basis according to the number of credit hours transferred and the employer's requirements.

Arrangements have been made or are in progress with many businesses, industrial organizations, and governmental agencies for employment opportunities.

COOPERATIVE PROGRAM WITH NAVY LABORATORIES

Arrangements have been made with the U.S. Naval Ship Research and Development Centers, Annapolis and Carderock, Md., and with other naval laboratories in which it is possible for the student to earn more than $10,500 on planned technical work assignments, obtain a Bachelor of Science degree in such areas as civil, electrical, or mechanical engineering, and be in a preferred position upon graduation to obtain a permanent Civil Service position with a grade and salary commensurate with the student's education and experience.

Tuition, textbooks, and fees (exclusive of room and board) up to 50 per cent may be granted on request. If tuition assistance is received, the cooperative student must agree to serve as a government civilian employee after graduation for a period equal to the period for which tuition is granted.

To participate in the program at the Naval laboratories, the student must be academically acceptable to the University and must meet the requirements of the Civil Service Commission for employment at these laboratories.

Work Experience.—This program integrates formal study at this School with practical work experience, an essential element of the educational process. The employment is related to the field of study in which the student is engaged, and it is diversified in order to afford breadth of experience. The work experience increases in difficulty and responsibility and, in general, parallels the student's progress through the academic phases of his program.

As a Civil Service employee, the co-op student is eligible for many federal benefits, including annual leave, sick leave, paid holidays, health benefits, and life insurance.

Freshman Admission.—Applications should be submitted during the fall term of the senior high school year. Students graduating at mid-term and wishing to begin study in the spring semester should apply no later than December 1.

Transfer Students Admission.—Transfer students from other institutions should submit application and required credentials prior to August 15 for the fall semester, December 15 for the spring semester, and May 1 for the summer sessions. The transfer student should be in good standing as to scholarship and conduct. He should be eligible to return to the last previously attended institution in the semester for which he seeks admission to this University.

Study-Work Schedule

		Grade	*Annual Pay Scale*
Preregistration Summer	Navy Laboratory	GS-2	$5,166
Freshman Year	George Washington University		
Summer	Navy Laboratory	GS-3	5,828
Sophomore Year	George Washington University		
Summer	Navy Laboratory	GS-4	6,544
Junior Year Fall	George Washington University		
Junior Year Extended, Spring, Summer, Fall	Navy Laboratory	GS-4	6,544
Junior Year Spring	George Washington University		
Summer	Navy Laboratory	GS-5	7,319
Senior Year	George Washington University		

For additional information, write to Coordinator, Cooperative Education Program in Engineering, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20006.

CONTINUING ENGINEERING EDUCATION

> The future of the engineering profession will depend to a considerable extent on the demonstrated competence of individual engineers to make optimum use of the latest scientific and technical knowledge in dealing with current and future problems. Participation in programs of continuing engineering studies will ensure that such competence can be maintained.*

The School of Engineering and Applied Science is meeting the need expressed above with a comprehensive program. The objective of the program is to enhance the competence of practicing engineers rather than to aid in their attainment of academic degrees. Tuition for the noncredit courses offered in the program is usually paid by the employers, who recognize the necessity for immediate improvement in the employee's on-the-job capability. The economic squeeze of the past several years has forced staff reorganizations in industry and government which have required many engineers to change their specialties or to take on additional duties within their present jobs; consequently, continuing engineering education is required to provide the skills necessary for these changes. Continuing engineering education also aids in qualifying for promotions.

The program presents about 60 noncredit courses each year. A majority of them last for five days (30 classroom hours), while others last for two, three, four, or ten days. Some courses are presented in the evening (two-hour sessions once a week for eight to ten weeks). In a number of courses, presentation of theory is augmented by workshops to give participants practice in the application of the particular discipline. Students from all over the nation and from Canada, Mexico, and England have participated in courses. Their variety of experience and background enhances the value of the discussions and enriches their relationships with each other and with their instructors.

Subjects which have been presented in this program include engineering management, system safety, air pollution control, engineering mathematics and statistics, solid waste management, structural dynamics, heat pipes, standards and calibration laboratories, laser technology, noise control, fracture and fatigue, technical writing, clinical engineering, antennas, communications systems, and ocean engineering. New courses are added as needs become apparent in various fields.

In addition to the distinguished faculty of the School of Engineering and Applied Science, outstanding lecturers and instructors from other universities, from industry, and from government laboratories and agencies have served on the instructional staff of the program.

The program also offers noncredit contract courses off-campus specifically tailored for the needs and background of the engineers employed by the contracting company or agency. Tuition for these courses is considerably lower than for those offered at the University.

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* Society for Engineering Education, *Final Report: Goals of Engineering Education* (Washington, D.C.: January, 1968).

To receive announcements or additional information on the program, write to Continuing Engineering Education Program, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20006.

Administration

Harold Liebowitz, D.Ae.E., *Dean of the School of Engineering and Applied Science; Co-director of the Joint Institute for Acoustics and Flight Sciences*

Galip Mehmet Arkilic, Ph.D., *Assistant Dean of the School of Engineering and Applied Science*

Paul Arthur Crafton, Ph.D., *Chairman of the Department of Engineering Administration*

Alfred Martin Freudenthal, D.Sc., *Chairman of the Department of Civil, Mechanical, and Environmental Engineering; Director of the Institute for the Study of Fatigue, Fracture, and Structural Reliability*

Walter Kurt Kahn, D.E.E., *Chairman of the Department of Electrical Engineering and Computer Science*

William Henry Marlow, Ph.D., *Chairman of the Department of Operations Research; Director of the Institute for Management Science and Engineering*

John Edward Duberg, Ph.D., *Director of the NASA-Langley Graduate Program; Director of the Joint Institute for Acoustics and Flight Sciences*

I. Edward Garrick, B.S., *Assistant Director of the NASA-Langley Graduate Program*

Malcolm P. Clark, M.S., *Administrator of the NASA-Langley Graduate Program*

John Lindsey Whitesides, Jr., Ph.D., *Coordinator of the GWU-NASA Program, NASA-Langley Research Center*

John Witherspoon, M.S., *Assistant Administrator of the NASA-Langley Graduate Program*

Shao Wen Yuan, Ph.D., *Coordinator of the NASA-Langley Graduate Program; Coordinator of the Joint Institute for Acoustics and Flight Sciences*

Jack Emerson Mansfield, B.S. in E.E., *Director of the Continuing Engineering Education Program*

Charles Donald Brown, B.S., *Continuing Engineering Education Officer*

Frederic A. Hooper, M.S., *Research and Resources Officer*

W.J. Scot Mannion, B.A., *Director of Engineering Admissions; Coordinator of the Cooperative Education Program in Engineering*

George Ellowitz, B.A., *Executive Assistant to the Dean*

DEAN'S COUNCIL

Harold Liebowitz *(Chairman)*, Marvin Eisenberg, J.V. Foa, John Kaye

ACADEMIC CONSULTANT

Ernst Weber, Ph.D., *Chairman, Division of Engineering, National Research Council*

Advisory Council*

THE PURPOSES of the Advisory Council for the School of Engineering and Applied Science are to strengthen communication between the School and the other colleges, schools, and divisions of the University as well as between the School and the University's Board of Trustees; to advise on the programs of instruction, research, and service in the School and to help interpret these programs to the community and the nation; and to stimulate support for the continued development of the School and its programs.

MEMBERS OF THE COUNCIL FOR 1972–73

Chairman: Stephen R. Woodzell *(University Trustee), Former President of the Potomac Electric Power Company*
Raymond L. Bisplinghoff, *Deputy Director, National Science Foundation*
Bruno A. Boley, *Dean, Technological Institute, Northwestern University*
George M. Bunker, *President, Martin Marietta Corporation*
J.P. Chambers, *President, Melpar Division E-Systems, Inc.*
Julian Eisenstein, *Chairman, Department of Physics*
Gregory E. Federline, *Student*
Moses Freedman, *Vice President, Blake Construction Company*
Alfred M. Freudenthal, *Chairman, Department of Civil, Mechanical, and Environmental Engineering*
Eugene G. Fubini, *Engineering Consultant*
Martin Goland, *President, Southwest Research Institute*
William J. Harris, Jr., *Vice President, Research and Test Department, Association of American Railroads*
Alexander Hassan, *Washington, D.C.*
Walter R. Hibbard, Jr., *Vice President, Research and Development, Owens Corning Fiberglas Corporation*
William Holt, *Carborundum Company, Niagara Falls, N.Y.*
William H. Marlow, *Chairman, Department of Operations Research*
Bernard A. Schriever, General USAF (Ret.), *Chairman of the Board, Schriever & McKee Associates, Inc.*
Arthur W. Sloan, *Chief Executive Officer, Susquehanna Corporation*
Lewis L. Strauss *(University Honorary Trustee), Corporate Trustee*
G.R. Tatum, *Vice President, Vitro Corporation*
Edward G. Uhl, *President, Fairchild-Hiller Corporation*
Ernst Weber, *Chairman, Division of Engineering, National Research Council*
Harold A. Wheeler, *Chief Scientist, Wheeler Laboratories, Inc.*
James F. Young, *Vice President—Engineering, General Electric Company*
L.A. Zadeh, *Chairman, Department of Electrical Engineering and Computer Sciences, University of California, Berkeley*

*The President of the University, the Vice President for Academic Affairs, and the Dean of the School of Engineering and Applied Science are ex officio members of the Advisory Council.

PROGRAMS OF STUDY AND COURSES OF INSTRUCTION

ON THE FOLLOWING PAGES are listed programs of study, curricula, and courses of instruction offered by the School of Engineering and Applied Science.

Students who are not candidates for degrees but who wish to take courses offered by the School should apply for admission to the Division of University Students.

EXPLANATION OF COURSE NUMBERS

Courses numbered from 1 through 199 are planned for undergraduate credit, although certain courses may be taken for graduate credit when arrangements are approved in advance by the instructor and the Dean. Courses numbered 201 to 300 are planned for graduate credit and may in certain instances be taken by qualified undergraduate students. Courses numbered from 301 to 400 are primarily for doctoral students.

SEMESTER HOURS OF CREDIT

The number of semester hours credit given for the satisfactory completion of a course is indicated in parentheses after the name of the course. Thus, a year course giving three hours of credit each semester is marked (3–3), and a semester course giving three hours credit is marked (3). A semester hour consists of the completion of one fifty-minute period of class work or of one laboratory period a week for one semester.

TIME OF COURSE OFFERINGS

Following course descriptions is a parenthetical statement listing the semester for which the course is scheduled to be offered. The term "academic year" is used only with two-semester courses, and indicates that the first half of the course is to be offered in the fall semester and the second half in the spring semester; the term "as arranged" is used for courses which could not be scheduled at the time of printing this catalogue. Offerings for the summer sessions are not designated in this catalogue. Students should consult the *Summer Sessions Catalogue* or *Schedule of Classes* for summer offerings. A *Schedule of Classes* is also published for each fall and spring semester which provides more exact and up-to-date information concerning the time of course offerings.

KEY TO ABBREVIATIONS

The following abbreviations are used in this catalogue for course designations and by students in registering for courses.

Acct	Accounting	Engl	English
Ap S	Applied Science	Geol	Geology
Chem	Chemistry	Math	Mathematics
CE	Civil Engineering	ME	Mechanical Engineering
CS	Computer Science	OR	Operations Research
Econ	Economics	Phys	Physics
EE	Electrical Engineering	Soc	Sociology
E Ad	Engineering Administration	Stat	Statistics
ES	Engineering Science	U&RP	Urban and Regional Planning

Applied Science

Interdepartmental offerings.

UNDERGRADUATE COURSES

1–2 **Engineering in Modern Society** (1–1)

The role of engineering in a technological society, conventional vs. modern engineering, engineering as a profession, problem-solving approach and engineering methods. (Offered every year: academic year—day; 1974–75 and alternate years: academic year—evening)

59 **Introductory Analytical Mechanics** (4)

Kinematics, statics, and dynamics of a particle, statics and dynamics of systems of particles, kinematics of a rigid body, geometrical and inertial parameters of rigid bodies, statics and dynamics of rigid bodies and beams. Introduction to Lagrangian-Hamiltonian formulation. Prerequisite: Phys 31. Prerequisite or concurrent registration: Ap S 113. (Spring)

113 **Engineering Analysis I** (3)

Analytical methods appropriate to the solution of engineering problems. Mathematical topics include matrices and linear algebra; ordinary differential equations, vector calculus, and integral theorems; complex algebra. Prerequisite: Math 32. (Fall and spring)

114 **Engineering Analysis II** (3)

Analytical methods appropriate to the solution of engineering problems. Mathematical topics include Bessel functions, Legendre polynomials, Fourier series and integrals, Laplace transform, partial differential equations and boundary-value problems. Prerequisite: Ap S 113. (Fall and spring)

115 **Probabilistic and Statistical Methods in Engineering** (3)

Solution of engineering problems using sets and functions; probability models; distributions and functions; statistical concepts and methods, including hypothesis testing, correlation, and regression. Prerequisite: Math 32. (Fall and spring)

GRADUATE COURSES

211 Mathematical Methods in Applied Science I (3)

Introduction to analytic function theory, including contour integration and conformal mapping. Elements of integral transforms with application to boundary-value problems. Prerequisite: approval of Department. (Fall and spring)

212 Mathematical Methods in Applied Science II (3)

Introduction to theory of finite and infinite dimensional vector spaces, generalized Fourier series, completeness property. Tensor calculus, curvilinear coordinates. Prerequisite: approval of Department. (Fall)

213 Mathematical Methods in Applied Science III (3)

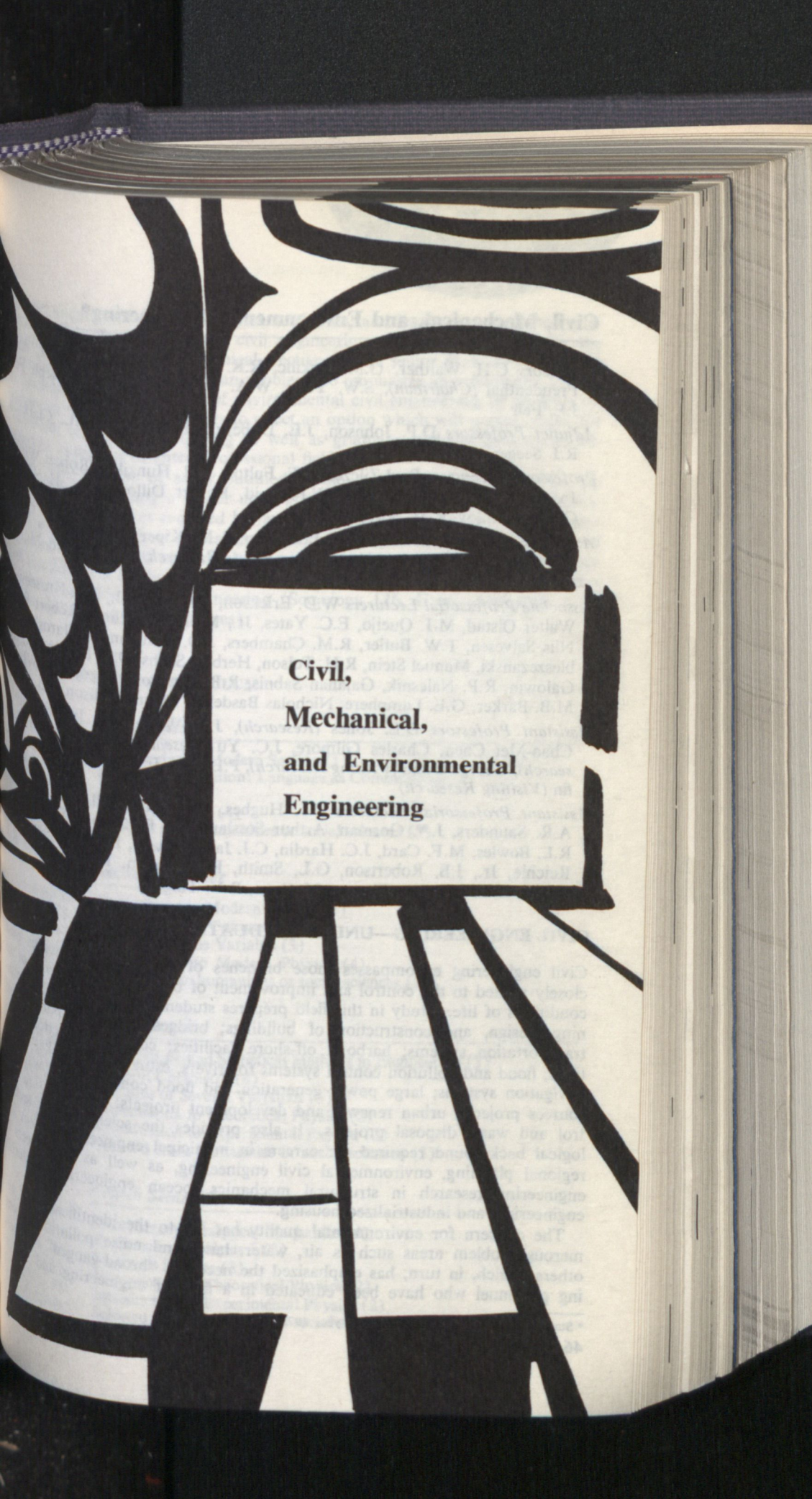
Classification of second-order linear partial differential equations, characteristics. Solution of boundary value problems associated with various equations of mathematical physics by separation of variables and Green's functions. Prerequisite: approval of Department. (Fall and spring)

214 Mathematical Methods in Applied Science IV (3)

Introduction to calculus of variations, Euler-Lagrange equations, variational formulation of boundary-value problems and approximate methods of solution. Theory of linear integral equations, including Fredholm and Hilbert-Schmidt theory. Prerequisite: approval of Department. (Spring)

215 Mathematical Methods in Applied Science V (3)

Perturbation methods in engineering: nonlinear ordinary differential equations, topological and classical methods of solution, asymptotic series, boundary-layer solutions; nonlinear partial differential equations, boundary-layer solutions which include singular initial value and boundary-value problems. Prerequisite: approval of Department. (Spring)


Civil,
Mechanical,
and Environmental
Engineering

Civil, Mechanical, and Environmental Engineering*

Professors C.H. Walther, G.M. Arkilic, R.R. Fox, Harold Liebowitz, A.M. Freudenthal *(Chairman)*, S.W. Yuan, W.A. Wood *(Research)*, Joseph Foa, J.E. Feir

Adjunct Professors D.P. Johnson, J.E. Duberg, I.E. Garrick, B.L. Clarkson, R.J. Seeger, A.A. Wolf

Professorial Lecturers Paul Zilczer, R.E. Fulton, R.R. Hunziker, Robert Wilson, Joseph Kirshner, M.P. Gaus, W.P. Reid, Robert Dillon, R.A. Hechtman, Charles Molloy, R.M. Sorensen

Associate Professors John Eftis, B.I. Hyman, A.M. Kiper, T.G. Toridis, J.S.W. Chi, A.K. Noor *(Research)*, Maurice Petyt *(Research)*, Parmanand Mungur *(Research)*

Associate Professorial Lecturers W.D. Erickson, R.W. Fralich, E.T. Kruszewski, Walter Olstad, M.J. Queijo, E.C. Yates, Jr., Michael Yachnis, Robert Perry, Nils Salvesen, T.W. Butler, R.M. Chambers, J.D. Shaughnessy, Jaroslaw Sobieszczanski, Manuel Stein, R.H. Tolson, Herbert Sachs, D.F. Bishop, Jr., L.S. Galowin, R.P. Nalesnik, Gajanan Sabnis, R.B. Samworth, Benjamin Whang, M.B. Barker, G.E. Lamphere, Nicholas Basdekas, Donald Ellison, J.B. Fisher

Assistant Professors D.L. Jones *(Research)*, J.L. Whitesides, Jr. *(Research)*, Chao-Mei Chen, Charles Gilmore, J.C. Yu *(Research)*, A.M. Bloom *(Research)*, George Kuhn *(Visiting Research)*, P.L. Coe, Jr. *(Research)*, M.J. Griffin *(Visiting Research)*

Assistant Professorial Lecturers F.J. Hughes, R.W. Barnwell, J.D. Buckley, A.R. Saunders, J.A. Gorman, Arthur Sosslau, K.J. Perlman, I.E. Beckwith, R.L. Bowles, M.F. Card, J.C. Hardin, C.J. Jachimowski, H.A. Leybold, H.G. Reichle, Jr., J.B. Robertson, G.L. Smith, R.E. Brown, R.M. Brown, R.J. Fisher, R.D. Matulka, Thomas McGean, R.Y. Ting

CIVIL ENGINEERING—UNDERGRADUATE STUDY

Civil engineering encompasses those branches of engineering activities most closely related to the control and improvement of our environment and of the conditions of life. Study in this field prepares students for careers in the planning, design, and construction of buildings; bridges; roads; airports; rapid transportation systems; harbors; off-shore facilities; coastal protection structures; flood and pollution control systems for rivers, estuaries, and lakes; inland navigation systems; large power generation and flood control dams; water resources projects; urban renewal and development projects; and pollution control and waste disposal projects. It also provides the scientific and technological background required for careers in municipal engineering, urban and regional planning, environmental civil engineering, as well as for careers in engineering research in structural mechanics, ocean engineering, materials engineering, and industrialized housing.

The concern for environmental quality has led to the identification of numerous problem areas such as air, water, land, and noise pollution, among others, which, in turn, has emphasized the need for "broad-gauged" engineering personnel who have been educated in a field of engineering and have a

* Staff of Instruction for the academic year 1972–73.

realistic understanding of the social, economic, and legal aspects of their professions. The flexibility in the civil engineering curriculum provided by the relatively large number of technical electives in the senior year allows students interested in contemporary urban problems to emphasize environmental aspects by branching off into an area of environmental civil engineering, or students interested in the use of computers to select an option which will prepare them for immediate careers in computing as well as graduate study in computer-dominated or computer-oriented professional fields.

The concentration of study outlined in the curriculum below provides the essentials for beginning a career upon graduation, for registration as a professional civil engineer as required by law, and for continuing study at the graduate level. The first four semesters are common to all undergraduate fields in the School; however, a student electing the environmental civil engineering option should select his humanities and social science electives with a view to his interest in environmental engineering (Sociology 126, *Urban Sociology*, must be included as one of his electives).

CIVIL ENGINEERING CURRICULUM

First Semester

Ap S 1:	Engineering in Modern Society (1)
Engl 1 or 1x:	English Composition: Language as Communication (3)
Math 30:	Precalculus (3)
Phys 1:	General Physics (4)
Elective:	Selected from humanities or social sciences (3)

Second Semester

Ap S 2:	Engineering in Modern Society (1)
EE 51:	Applications of Computers (3)
Math 31:	Calculus of One Variable (3)
Phys 2:	Introduction to Modern Physics (4)
Elective:	Selected from humanities or social sciences (3)

Third Semester

Ap S 115:	Probabilistic and Statistical Methods in Engineering (3)
Chem 13:	General Chemistry (4)
Math 32:	Calculus of Several Variables (3)
Phys 31:	Introduction to Theoretical Physics (2)
Phys 51:	Introduction to Experimental Physics (2)
Elective:	Selected from humanities or social sciences (3)

Fourth Semester

Ap S 59:	Introductory Analytical Mechanics (4)
Ap S 113:	Engineering Analysis I (3)
CE 140:	Materials Science (3)
Phys 32:	Introduction to Theoretical Physics (2)
Phys 52:	Introduction to Experimental Physics (2)
Elective:	Selected from humanities or social sciences (3)

Fifth Semester

Ap S 114: Engineering Analysis II (3)
CE 120: Introduction to the Mechanics of Solids (4)
CE 123: Structural Theory (6)
ME 131: Thermodynamics (3)

Sixth Semester

CE 183: Urban Planning (3)
CE 190: Legal and Economic Aspects of Engineering (2)
Geol 136: Engineering Geology (3)
ME 126: Fluid Mechanics (3)
Elective: Selected from humanities or social sciences (6)

Seventh Semester

CE 166: Materials Engineering (2)
CE 167: Mechanics of Materials Laboratory (1)
CE 168: Introductory Soil Mechanics (3)
CE 191: Metal Structures (3)
CE 193: Hydraulics and Hydrology (3)
Elective: Technical electives (6)

Eighth Semester

CE 182: Foundation Engineering (2)
CE 185: Soil Mechanics and Foundation Engineering Laboratory (1)
CE 192: Reinforced Concrete Structures (3)
CE 194: Environmental Engineering I: Water Supply and Resources (3)
Elective: Technical electives (8)

*Technical Electives**

CE 186: Advanced Mechanics of Solids (3)
CE 197: Environmental Engineering II: Waste and Pollution Control (3)
CE 201: Design of Metal Structures (3)
CE 202: Design of Reinforced Concrete Structures (3)
CE 203: Prestressed Concrete Structures (3)
CE 212: Engineering Climatology (3)
CE 215: Urban Construction Technology (3)
CE 220: Urban Transportation Engineering (3)
CE 253: Failure and Reliability Analysis of Engineering Structures (3)
CE 256: Introduction to Ocean and Coastal Engineering (3)
ES 234: Composite Materials (3)
Geol 125: Marine Geology (3)
Geol 181: General Oceanography (3)
Geol 189: Geophysics of the Solid Earth (2)
U&RP 207: Land Development Planning (3)

COMPUTER-ORIENTED CIVIL ENGINEERING OPTION

The rapidly expanding use of computers in the design and control of engineering systems provides increasing opportunities for engineering careers in which, upon graduation, a high degree of proficiency and ease in the extensive and

* For Geology and Urban and Regional Planning course descriptions, see the *Undergraduate and Graduate Catalogue*.

sophisticated use of digital and other computers is essential. This program therefore replaces the technical electives of the principal professional undergraduate program with electives that provide comprehensive exposure to computer applications to the solution of problems of civil engineering. It prepares the student for immediate careers as well as for graduate study in computer-dominated or computer-oriented professional fields.

CURRICULUM

First Semester

Ap S 1: Engineering in Modern Society (1)
Engl 1 or 1x: English Composition: Language as Communication (3)
Math 30: Precalculus (3)
Phys 1: General Physics (4)
Elective: Selected from humanities or social sciences (3)

Second Semester

Ap S 2: Engineering in Modern Society (1)
EE 51: Applications of Computers (3)
Math 31: Calculus of One Variable (3)
Phys 2: Introduction to Modern Physics (4)
Elective: Selected from humanities or social sciences (3)

Third Semester

Ap S 115: Probabilistic and Statistical Methods in Engineering (3)
Chem 13: General Chemistry (4)
Math 32: Calculus of Several Variables (3)
Phys 31: Introduction to Theoretical Physics (2)
Phys 51: Introduction to Experimental Physics (2)
Elective: Selected from humanities or social sciences (3)

Fourth Semester

Ap S 59: Introductory Analytical Mechanics (4)
Ap S 113: Engineering Analysis I (3)
CE 140: Materials Science (3)
Phys 32: Introduction to Theoretical Physics (2)
Phys 52: Introduction to Experimental Physics (2)
Elective: Selected from humanities or social sciences (3)

Fifth Semester

Ap S 114: Engineering Analysis II (3)
CE 120: Introduction to the Mechanics of Solids (4)
CE 123: Structural Theory (6)
ME 131: Thermodynamics (3)

Sixth Semester

CE 183: Urban Planning (3)
CE 190: Legal and Economic Aspects of Engineering (2)
Geol 136: Engineering Geology (3)

ME 126: Fluid Mechanics (3)
Elective: Selected from humanities or social sciences (6)

Seventh Semester

CE 166: Materials Engineering (2)
CE 167: Mechanics of Materials Laboratory (1)
CE 168: Introductory Soil Mechanics (3)
CE 191: Metal Structures (3)
CE 193: Hydraulics and Hydrology (3)
Elective: Technical electives (6)

Eighth Semester

CE 182: Foundation Engineering (2)
CE 185: Soil Mechanics and Foundation Engineering Laboratory (1)
CE 192: Reinforced Concrete Structures (3)
CE 194: Environmental Engineering I: Water Supply and Resources (3)
Elective: Technical electives (8)

Technical Electives

CS 278: Analog and Hybrid Computers (3)
EE 152: Introduction to Digital Computers (3)
ES 282: Computer-aided Design (3)
ES 283: Application of Computer Graphics in Engineering (3)
ES 284: Numerical Methods in Engineering (3)

ENVIRONMENTAL CIVIL ENGINEERING OPTION

Environmental civil engineering is concerned with the study of the problems of environmental quality—air, water, land, noise, transportation, urban renewal, etc.—that affect the life, development, and behavior of the individual as well as society. One of the goals of this program is to provide the student with the essentials for beginning a career upon graduation so that he may be in a position to contribute to the solutions of the problems related to the improvement of environmental quality. The program provides study of a comprehensive cross section of several fields of civil engineering—structures, materials, hydraulics, transportation, waste control—combined with allied fields in urban and regional planning, legal and legislative practices, and the social sciences which emphasize environmental aspects. The curriculum prepares the student for graduate study or for a career in environmental civil engineering.

CURRICULUM

First Semester

Ap S 1: Engineering in Modern Society (1)
Engl 1 or 1*x*: English Composition: Language as Communication (3)
Math 30: Precalculus (3)
Phys 1: General Physics (4)
Elective: Selected from humanities or social sciences (3)

Second Semester

Ap S 2: Engineering in Modern Society (1)
EE 51: Applications of Computers (3)
Math 31: Calculus of One Variable (3)
Phys 2: Introduction to Modern Physics (4)
Elective: Selected from humanities or social sciences (3)

Third Semester

Ap S 115: Probabilistic and Statistical Methods in Engineering (3)
Chem 13: General Chemistry (4)
Math 32: Calculus of Several Variables (3)
Phys 31: Introduction to Theoretical Physics (2)
Phys 51: Introduction to Experimental Physics (2)
Elective: Selected from humanities or social sciences (3)

Fourth Semester

Ap S 59: Introductory Analytical Mechanics (4)
Ap S 113: Engineering Analysis I (3)
CE 140: Materials Science (3)
Phys 32: Introduction to Theoretical Physics (2)
Phys 52: Introduction to Experimental Physics (2)
Elective: Selected from humanities or social sciences (3)

Fifth Semester

Ap S 114: Engineering Analysis II (3)
CE 120: Introduction to the Mechanics of Solids (4)
CE 123: Structural Theory (6)
ME 131: Thermodynamics (3)

Sixth Semester

CE 183: Urban Planning (3)
CE 190: Legal and Economic Aspects of Engineering (2)
Geol 136: Engineering Geology (3)
ME 126: Fluid Mechanics (3)
Elective: Selected from humanities or social sciences (6)

Seventh Semester

CE 166: Materials Engineering (2)
CE 167: Mechanics of Materials Laboratory (1)
CE 168: Introductory Soil Mechanics (3)
CE 193: Hydraulics and Hydrology (3)
CE 197: Environmental Engineering II: Waste and Pollution Control (3)
Elective: Technical electives (6)

Eighth Semester

CE 182: Foundation Engineering (2)
CE 185: Soil Mechanics and Foundation Engineering Laboratory (1)
CE 192: Reinforced Concrete Structures (3)
CE 194: Environmental Engineering I: Water Supply and Resources (3)
Elective: Technical electives (8)

*Technical Electives**

B Sc 11–12:	Introductory Biology for Science Majors (4–4)
Chem 50:	Introduction to Organic Chemistry (4)
CE 212:	Engineering Climatology (3)
CE 215:	Urban Construction Technology (3)
CE 220:	Urban Transportation Engineering (3)
CE 256:	Introduction to Ocean and Coastal Engineering (3)
Geol 125:	Marine Geology (3)
Geol 181:	General Oceanography (3)
Geol 241:	Geochemistry (3)
ME 176:	Environmental Engineering Problems (3)
†Soc 126:	Urban Sociology (3)
U&RP 201:	Introduction to Urban Planning (3)
U&RP 205:	Urban Housing (3)
U&RP 207:	Land Development Planning (3)
U&RP 208:	Urban Transportation Planning (3)

CIVIL ENGINEERING UNDERGRADUATE COURSES

120 **Introduction to the Mechanics of Solids** (4)

Three-dimensional strain and stress. Constitutive equations for elastic, viscoelastic, and plastic materials. Axial load, bending and torsion of struts and beams. Instability and failure. Prerequisite: Ap S 59. (Fall)

123 **Structural Theory** (6)

Theory of determinate and indeterminate structures using both classical and modern approaches. Prerequisite or concurrent registration: CE 120. (Fall)

140 **Materials Science** (3)

Electron structure of atoms; atomic and molecular bonding; energy bands; crystal structure; imperfections; noncrystalline solids; reaction rates; diffusion; transport phenomena—thermal conductivity, electrical conduction; semiconductors; magnetism; elasticity and anelastic phenomena; microplasticity; plastic deformation; fracture. Prerequisite or concurrent registration: Ap S 113, Phys 32. (Spring)

166 **Materials Engineering** (2)

Mechanical properties and their description; effect of microstructure on the mechanical behavior of metals, ceramics, polymers, and polyphase materials; effect of strain-rate and temperature; creep, fatigue, and fracture; effect of surface and environment; materials evaluation for structural performance. Prerequisite: CE 120, 140; or approval of Department. (Fall)

167 **Mechanics of Materials Laboratory** (1)

Measurement of strains and forces; determination of elastic, anelastic, and rubber-elastic parameters; observation of microplastic and plastic deformation; plastic instability; creep, creep-instability, and creep-fracture; brittle fracture; fatigue; cyclic state. Prerequisite or concurrent registration: CE 166. (Fall)

* For Biological Sciences, Chemistry, Geology, and Urban and Regional Planning course descriptions, see the *Undergraduate and Graduate Catalogue*.

† Sociology 126 must be included as one of the electives during the first year of study.

168 **Introductory Soil Mechanics** (3)

Engineering properties of soils; analysis of lateral earth pressures, bearing capacity, foundations, and slope stability. Prerequisite: CE 120, ME 126. (Fall)

182 **Foundation Engineering** (2)

Subsurface exploration, design of shallow foundations, design of pile foundations, earth-retaining structures. Prerequisite: CE 168. (Spring)

183 **Urban Planning** (3)

Engineering aspects of urban planning, including transportation, water supply and sewerage, public utilities, safety and convenience, and natural environment. (Spring)

185 **Soil Mechanics and Foundation Engineering Laboratory** (1)

Laboratory experiments for the classification, strength, compressibility, and general engineering properties of soils. Prerequisite: CE 168. (Spring)

186 **Advanced Mechanics of Solids** (3)

Constitutive equations, elastic, viscoelastic, elastic-plastic, and viscoplastic response. Beam theory, eccentric bending, buckling, torsion. Failure criteria and failure mechanisms. Prerequisite: CE 120, 166, 167. (As arranged)

190 **Legal and Economic Aspects of Engineering** (2)

Laws relating to engineering practice, preparation of contract documents and specifications, consideration of economic factors in engineering design decisions. (Spring)

191 **Metal Structures** (3)

Principles of the design of metal structures; structural elements; connections; specific problems of analysis; methods of construction. (Fall)

192 **Reinforced Concrete Structures** (3)

Principles of the design of reinforced concrete structures. Details of reinforcement of structural elements. Monolithic structures, precast elements, methods of construction. (Spring)

193 **Hydraulics and Hydrology** (3)

Fluid transport in open and closed conduits. Gravity waves, theory of ground water movement, elements of surface hydrology, rainfall and runoff, groundwater hydrology. Civil engineering and hydrogeological applications of seepage, drainage, sea water intrusion in coastal areas, well flow, etc. Statistical hydrology. (Fall)

194 **Environmental Engineering I: Water Supply and Resources** (3)

Planning and design of water supply and waste-water disposal systems. Water quality control and treatment processes. Desalination, stream pollution control. Prerequisite: CE 193 and senior status. (Spring)

197 **Environmental Engineering II: Waste and Pollution Control** (3)

Disposal of sewage, biological treatment, chemical treatment, filtration, activated sludge, sludge handling and disposal. Control of industrial wastes and of nuclear waste products. Solid waste disposal. Prerequisite: senior status. (Fall)

198 **Research** (1 to 3)
Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. (Fall and spring)

MECHANICAL ENGINEERING—UNDERGRADUATE STUDY

Mechanical engineering is primarily concerned with physical systems in motion. A mechanical engineer is concerned with the conversion, transfer, and control of energy from its source to its moving system. He has contributed to our present technology in every industry and in every phase of research, design, development, and production. Land and marine vehicles, transportation systems, air-conditioning systems, nuclear reactors and fuel cells, low-pollution control devices, and a host of other devices lie in his domain. His training should provide him with the ability to formulate problems based on fundamental laws of nature, to recognize the types of methods which are applicable to their solution, to read with understanding the relevant work, and to come up with a usable answer. The mechanical engineering curriculum provides a background for careers in research, design, development, and manufacture in a wide variety of industries.

Course offerings in the field of mechanical engineering, which begin with a broad foundation in physics, chemistry, mathematics, humanities, and social sciences, consist of studies in basic mechanics of solids and fluids, electricity and electronics, material sciences, dynamic analysis, thermal sciences, energy conversion and power, environmental control, and the design of machines and systems and their control. Furthermore, technical electives in the senior year allow students interested in the use of computers to select an option which will prepare them for immediate careers in computing as well as graduate study in computer-dominated or computer-oriented professional fields. The program of study outlined below is based on the concept that the mechanical engineer must be prepared to meet the challenge of ever-increasing technical, economic, and social problems.

Graduates are qualified for professional positions in design, analysis, manufacture, and application of machines, process, and control, or in research and development, as well as for graduate work.

MECHANICAL ENGINEERING CURRICULUM

First Semester

Ap S 1:	Engineering in Modern Society (1)
Engl 1 or 1x:	English Composition: Language as Communication (3)
Math 30:	Precalculus (3)
Phys 1:	General Physics (4)
Elective:	Selected from humanities or social sciences (3)

Second Semester

Ap S 2:	Engineering in Modern Society (1)
EE 51:	Applications of Computers (3)
Math 31:	Calculus of One Variable (3)
Phys 2:	Introduction to Modern Physics (4)
Elective:	Selected from humanities or social sciences (3)

Third Semester

Ap S 115: Probabilistic and Statistical Methods in Engineering (3)
Chem 13: General Chemistry (4)
Math 32: Calculus of Several Variables (3)
Phys 31: Introduction to Theoretical Physics (2)
Phys 51: Introduction to Experimental Physics (2)
Elective: Selected from humanities or social sciences (3)

Fourth Semester

Ap S 59: Introductory Analytical Mechanics (4)
Ap S 113: Engineering Analysis I (3)
CE 140: Materials Science (3)
Phys 32: Introduction to Theoretical Physics (2)
Phys 52: Introduction to Experimental Physics (2)
Elective: Selected from humanities or social sciences (3)

Fifth Semester

Ap S 114: Engineering Analysis II (3)
CE 120: Introduction to the Mechanics of Solids (4)
EE 11: Linear Networks I (3)
ME 131: Thermodynamics (3)
Elective: Selected from humanities or social sciences (3)

Sixth Semester

EE 20: Introductory Engineering Electronics (3)
ME 120: Methods of Engineering Experimentation (2)
ME 126: Fluid Mechanics (3)
ME 134: Introduction to Vibration Analysis (3)
ME 148: Thermodynamic Analysis (3)
Elective: Selected from humanities or social sciences (3)

Seventh Semester

CE 166: Materials Engineering (2)
CE 167: Mechanics of Materials Laboratory (1)
ME 155: Compressible Fluid Flow (3)
ME 171: Mechanics of Deformable Solids I (3)
ME 187: Heat Transfer Theory (3)
ME 191: Mechanical Design (3)
Elective: Technical elective (3)

Eighth Semester

EE 172: Control Systems (3)
ME 152: Mechanical Engineering Laboratory (2)
ME 176: Environmental Engineering Problems (3)
ME 193: Engineering Systems Design (3)
ME 194: Energy Conversion (3)
Elective: Technical elective (3)

Technical Electives

CE 197: Environmental Engineering II: Waste and Pollution Control (3)
ME 161: Advanced Dynamics (3)
ME 215: Theory of Vibrations (3)
ME 221: Intermediate Fluid Mechanics (3)

ME 225: Turbomachinery I (3)
ME 237: Propulsion I (3)
ME 240: Kinematic Synthesis (3)
ME 247: Fluidics (3)
ME 251–52: Transportation (3–3)

COMPUTER-ORIENTED MECHANICAL ENGINEERING OPTION

The rapidly expanding use of computers in the design and control of engineering systems provides increasing opportunities for engineering careers in which, upon graduation, a high degree of proficiency and ease in the extensive and sophisticated use of digital and other computers is essential. This program therefore replaces the technical electives of the principal professional undergraduate program with electives that provide comprehensive exposure to computer applications to the solution of all problems of mechanical engineering. It prepares the student for immediate careers as well as for graduate study in computer-dominated or computer-oriented professional fields.

CURRICULUM

First Semester

Ap S 1: Engineering in Modern Society (1)
Engl 1 or 1x: English Composition: Language as Communication (3)
Math 30: Precalculus (3)
Phys 1: General Physics (4)
Elective: Selected from humanities or social sciences (3)

Second Semester

Ap S 2: Engineering in Modern Society (1)
EE 51: Applications of Computers (3)
Math 31: Calculus of One Variable (3)
Phys 2: Introduction to Modern Physics (4)
Elective: Selected from humanities or social sciences (3)

Third Semester

Ap S 115: Probabilistic and Statistical Methods in Engineering (3)
Chem 13: General Chemistry (4)
Math 32: Calculus of Several Variables (3)
Phys 31: Introduction to Theoretical Physics (2)
Phys 51: Introduction to Experimental Physics (2)
Elective: Selected from humanities or social sciences (3)

Fourth Semester

Ap S 59: Introductory Analytical Mechanics (4)
Ap S 113: Engineering Analysis I (3)
CE 140: Materials Science (3)
Phys 32: Introduction to Theoretical Physics (2)
Phys 52: Introduction to Experimental Physics (2)
Elective: Selected from humanities or social sciences (3)

Fifth Semester

Ap S 114: Engineering Analysis II (3)
CE 120: Introduction to the Mechanics of Solids (4)

EE 11: Linear Networks I (3)
ME 131: Thermodynamics (3)
Elective: Selected from humanities or social sciences (3)

Sixth Semester

EE 20: Introductory Engineering Electronics (3)
ME 120: Methods of Engineering Experimentation (2)
ME 126: Fluid Mechanics (3)
ME 134: Introduction to Vibration Analysis (3)
ME 148: Thermodynamic Analysis (3)
Elective: Selected from humanities or social sciences (3)

Seventh Semester

CE 166: Materials Engineering (2)
CE 167: Mechanics of Materials Laboratory (1)
ME 155: Compressible Fluid Flow (3)
ME 187: Heat Transfer Theory (3)
ME 191: Mechanical Design (3)
Elective: Technical electives (6)

Eighth Semester

EE 172: Control Systems (3)
ME 152: Mechanical Engineering Laboratory (2)
ME 193: Engineering Systems Design (3)
ME 194: Energy Conversion (3)
Elective: Technical electives (6)

Technical Electives

CS 278: Analog and Hybrid Computers (3)
EE 152: Introduction to Digital Computers (3)
ES 282: Computer-aided Design (3)
ES 283: Application of Computer Graphics in Engineering (3)
ES 284: Numerical Methods in Engineering (3)

MECHANICAL ENGINEERING UNDERGRADUATE COURSES

120 Methods of Engineering Experimentation (2)

Acquisition and analysis of experimental data. Laws of modeling and simulation. Report formulation and presentation. Basic principles of various measuring instruments and sensors. Laboratory experiments, including use of strain gages, oscilloscopes, various tranducers, etc. Introduction to basic experimental techniques related to dynamics, fluid flow, and thermal sciences. Prerequisite: Phys 51, 52. (Spring)

126 Fluid Mechanics (3)

Fluid properties, regimes in fluid mechanics, fluid statics, fluid kinematics, basic equations, one- and two-dimensional inviscid incompressible flow, viscous incompressible flow, dimensional method. Prerequisite: Ap S 59. (Spring)

131 Thermodynamics (3)

Fundamental thermodynamic concepts, Zeroth law of thermodynamics and temperature measurements, work and heat, first law of thermodynamics, properties of pure substances, first-law analysis of some thermo-

dynamic systems, second law of thermodynamics, reversibility, entropy, second-law analysis of thermodynamic systems. Prerequisite or concurrent registration: Ap S 59. (Fall)

134 **Introduction to Vibration Analysis** (3)
(Formerly Dynamics of Linear Systems)
Natural frequencies and response of single- and multiple-degree of freedom mechanical systems to dynamic loads. Effect of damping, transient and steady-state analysis. Prerequisite: Ap S 59, 114. (Spring)

148 **Thermodynamic Analysis** (3)
Analysis of thermodynamic power and refrigeration cycles; thermodynamics of mixtures of substances; properties of air-water vapor mixtures; psychrometry and analysis of cooling tower and air-conditioning plant; third law of thermodynamics and absolute entropy; evaluation of combustion processes. Molecular distributions and models; introduction to statistical and quantum mechanics; statistical thermodynamics and thermodynamic properties of gases and solids. Prerequisite: ME 131. (Spring)

152 **Mechanical Engineering Laboratory** (2)
Experimental study of various engineering systems. Laboratory projects include experimental design, modeling and simulation parameters, data acquisition, and report presentation techniques. Prerequisite: ME 120. (As arranged)

155 **Compressible Fluid Flow** (3)
Introduction to compressible flow, basic equations, propagation of motion in compressible fluids, isotropic-flow relations, steady one-dimensional flow, wave phenomena, small perturbation theory, slender-body theory, method of characteristics. Prerequisite: ME 126, 131. (Fall)

161 **Advanced Dynamics** (3)
Rigid-body dynamics and Euler's equations. Balancing of rotating shafts; analysis of spinning tops and tyroscopes; evaluation of dynamic forces in machines. Lagrange's equations for particles, rigid bodies, and systems. Prerequisite: ME 134. (Fall)

171 **Mechanics of Deformable Solids I** (3)
Fundamentals of stress analysis of elastic bodies. Stresses in thick-walled cylinders; torsion of shafts of arbitrary cross-section; shear stresses in thin-walled tubes; stress and deflection analysis of complex systems; stress concentration; impact. Prerequisite: CE 120. (Fall)

172 **Mechanics of Deformable Solids II** (3)
Yield criteria, theories of plastic deformation. Elastic-plastic analysis in bending and torsion. Thick-rolled cylinders, shakedown theorems, residual stresses. Basic concepts of slip-line theory. Fundamentals of creep analysis. Introduction to ASME Boiler and Pressure Vessel Code. Prerequisite: ME 171. (Spring)

176 **Environmental Engineering Problems** (3)
Classification and effects of air pollutants; air-quality criteria and standards; analysis of pollutants; sources of pollutants and emission inventory; emission-control equipment. Water-quality standards; sewage and industrial waste characterization and pollutional effects in natural waters; primary, biological, and tertiary treatment of wastes; sludge handling and disposal. Prerequisite: senior status. (Spring)

187 **Heat Transfer Theory** (3)

Heat transfer processes. General heat conduction equations; steady- and unsteady-state heat conduction problems. Methods of analysis; analytical, analog, and numerical solution methods. Fundamentals of convective-heat transfer. Evaluation of convective-heat transfer coefficients; dimensional analysis, boundary-layer approach, analogy between heat and momentum transfer. Energy exchange by thermal radiation; fundamental concepts and laws, radiation properties, radiative-heat transfer between surfaces. Design considerations; heat-exchanger design and selection. Prerequisite: Ap S 114, ME 126. (Fall)

191 **Mechanical Design** (3)

Introduction to design concept, selection of materials, and strength of mechanical elements; design of machine components such as shafts, springs, bearings, gears, couplings, screws, and related mechanical components. Prerequisite: senior status. (Fall)

193 **Engineering Systems Design** (3)

Principles of creative design and system-design concept. Engineering economics, modeling and simulation of physical systems, optimization techniques. Analog and digital computer-aided design methods. Special design projects which may integrate with ME 152 *Mechanical Engineering Laboratory* projects. Prerequisite: ME 191. (Spring)

194 **Energy Conversion** (3)

Energy resources of the earth; energy, society, and the national economy; issue of energy and the environment, future outlook for energy supply and demand. Conversion of energy; fundamental principles and technological options, efficiency of different energy converters. Current technologies and longer-range possibilities. Generation of electricity, trends in the electricity industry; nuclear power systems—growth, economic, and environmental impacts. Unconventional methods of power generation; direct energy conversion. Prerequisite: EE 20, ME 148. (Spring)

198 **Research** (1 to 3)

Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. (Fall and spring)

GRADUATE STUDY

Dynamic developments in science and technology in decades to come will require that the engineer keep pace with newly emerging technological disciplines, as well as with new techniques in analysis, design, and computation. Under these circumstances, it is evident that graduate education in advanced technology will assume a vital responsibility in answering the needs of a technologically oriented society. Amidst the proliferation of knowledge and technological specialty, the School adheres to the principle that versatility and depth in scientific fundamentals should be the characteristic features of any graduate program of study that attempts to prepare the graduate student to cope with the engineering developments of today and of the future.

The Department of Civil, Mechanical, and Environmental Engineering offers graduate programs of study in the various areas of concentration in the professional disciplines of civil and mechanical engineering. Its professional as

well as basic interdisciplinary programs encompass the broad areas of solid mechanics, structural engineering, geotechnics and foundation engineering, ocean and marine engineering, public works engineering, urban environmental engineering, risk assessment and assurance technology, computer-aided structural design, flight sciences, mechanical engineering design, environmental control, energy and power, transportation engineering, thermal sciences, materials engineering, hydromechanics, fluid mechanics, and aerospace engineering. Within these broad categories are basic programs of study and research in the elasticity, inelasticity, and fracture of solids; the mechanics of continua; the structure and properties of materials; the theory of plates, shells, and elastic stability; advanced structural analysis and design, including structural reliability; structural dynamics; soil mechanics; classical and statistical thermodynamics; heat and mass transfer; energy conversion; combustion processes; incompressible, compressible, laminar, viscous, turbulent, hypersonic, and nonsteady flows; hydrodynamics and oceanography; gas dynamics and reaction kinetics; analytical and nonlinear mechanics; advanced dynamics; atmospheric space flight and celestial mechanics; dynamic stability of flight structures; propulsion systems; and aerothermochemistry. As part of the interdisciplinary program, students elect approved courses from other departments of the School of Engineering and Applied Science, as well as from other schools and divisions of the University. Depending upon the interest of the student, some of the programs leading to the degrees of Master of Science and (by special permission of the appropriate department chairman) Doctor of Science are given at the NASA-Langley Research Center, Langley Station, Hampton, Virginia. NASA-Langley's extensive scientific and engineering facilities and equipment are utilized whenever feasible. Arrangements can also be made to use the facilities and equipment of the Naval Ship Research and Development Centers, Annapolis and Carderock, Maryland, where off-campus Master's degree programs have been initiated.

Each program is arranged to fit the individual needs and interests of the graduate student, and at the same time to utilize effectively his previous experience and background. This background should normally include an undergraduate degree in engineering, the physical sciences, or applied mathematics. Each graduate student is assigned a faculty adviser on the basis of his study interests, thereby enabling a close student-faculty relationship to develop during the course of his program.

FIELDS AND AREA OF CONCENTRATION

Programs of study in any field of concentration will generally include courses from appropriate allied areas.

Acoustics*

Ap S 211:	Mathematical Methods in Applied Science I
Ap S 213:	Mathematical Methods in Applied Science III
Ap S 215:	Mathematical Methods in Applied Science V
*ES 203–4:	Probability and Statistics of Metrology
*ES 270:	Introduction to Acoustics
*ES 271:	Random Process Theory I

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

*ES 272: Random Process Theory II
*ES 273: Time Series Analysis
*ES 274: Noise and Vibration Control
*ES 275: Advanced Theoretical Acoustics
*ES 276: Acoustical and Mechanical Measurements
*ES 277: Physical Acoustics
*ES 278: Psychological and Physiological Acoustics
*ES 279: Human Factors in Engineering
*ES 280: Special Topics in Acoustics
ES 298: Research
ES 299–300: Thesis Research
*ES 310: Aeroacoustics
*ES 311: Nonlinear Acoustics
*ES 312: Theory of Random Vibration
*ES 313: Structural Acoustic Interaction
ES 398: Advanced Reading and Research
ES 399: Dissertation Research
ME 215: Theory of Vibrations
ME 216: Structural Dynamics
ME 221: Intermediate Fluid Mechanics
ME 312: Theory of Turbulence

Aerospace Engineering*

Ap S 211: Mathematical Methods in Applied Science I
Ap S 212: Mathematical Methods in Applied Science II
Ap S 213: Mathematical Methods in Applied Science III
Ap S 214: Mathematical Methods in Applied Science IV
Ap S 215: Mathematical Methods in Applied Science V
ES 217: Analytical Mechanics
ES 220: Nonlinear Mechanics
*ES 263: Atmospheric Physics for Engineers
*ES 273: Time Series Analysis
ME 221: Intermediate Fluid Mechanics
ME 222: Applied Fluid Dynamics
ME 235: Compressible Flow
*ME 248: Seminar: Aircraft Design
ME 275: Stability and Control of Vehicles
*ME 276: Mechanics of Space Flight
ME 283: Nuclear Reactor Engineering
ME 298: Research
ME 299–300: Thesis Research
ME 398: Advanced Reading and Research
ME 399: Dissertation Research

Computer-aided Structural Design

Ap S 211: Mathematical Methods in Applied Science I
Ap S 212: Mathematical Methods in Applied Science II
Ap S 213: Mathematical Methods in Applied Science III
Ap S 214: Mathematical Methods in Applied Science IV
Ap S 215: Mathematical Methods in Applied Science V
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 261: Analysis of Plates and Shells
CE 263: Theory of Structural Stability

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

EE 157: Machine and Assembly Language Programming
ES 221: Theory of Elasticity I
ES 282: Computer-aided Design
ES 283: Application of Computer Graphics in Engineering
ES 284: Numerical Methods in Engineering
ES 285: Finite Element Methods in Engineering Mechanics
*ES 286: Analysis and Design of Thin-walled Structures
*ES 287: Automated Design of Complex Structures
ES 289: Special Topics in Structural Design
ES 299–300: Thesis Research
ES 398: Advanced Reading and Research
ES 399: Dissertation Research
ME 215: Theory of Vibrations
ME 216: Structural Dynamics
OR 251: Linear Programming

Environmental Control

Ap S 213: Mathematical Methods in Applied Science III
CE 211: Engineering Aspects of Waste Control
CE 212: Engineering Climatology
CE 217: Water Resources Engineering I
CE 218: Water Resources Engineeering II
CE 219: Groundwater and Seepage
E Ad 221–22: Environmental Management
*ES 270: Introduction to Acoustics
*ES 274: Noise and Vibration Control
ME 221: Intermediate Fluid Mechanics
ME 224: Fundamentals of Combustion Engines
ME 225: Turbomachinery I
ME 226: Turbomachinery II
ME 260: Heating, Refrigeration, and Air Conditioning
ME 261: Fundamentals of Environmental Control I
ME 262: Fundamentals of Environmental Control II
ME 263: Environmental Control Processes I
ME 264: Environmental Control Processes II
ME 265: Air-pollution Meteorology
ME 266: Air-pollutants Sampling and Analysis
ME 282: Energy Technology
ME 288: Convective Heat and Mass Transfer
ME 291–92: Power Systems
ME 298: Research
ME 299–300: Thesis Research
ME 398: Advanced Reading and Research
ME 399: Dissertation Research

Energy and Power

Ap S 211: Mathematical Methods in Applied Science I
Ap S 213: Mathematical Methods in Applied Science III
Ap S 215: Mathematical Methods in Applied Science V
EE 133: Electromagnetic Waves
EE 236: Plasma Dynamics
ME 221: Intermediate Fluid Mechanics
ME 224: Fundamentals of Combustion Engines

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

ME 225: Turbomachinery I
ME 226: Turbomachinery II
ME 227: Viscous Flow
ME 235: Compressible Flow
ME 237: Propulsion I
ME 238: Propulsion II
ME 281: Nonequilibrium Thermodynamics
ME 282: Energy Technology
*ME 283: Nuclear Reactor Engineering
ME 287: Heat Conduction
ME 288: Convective Heat and Mass Transfer
E 291–92: Power Systems
ME 298: Research
E 299–300: Thesis Research
ME 398: Advanced Reading and Research
ME 399: Dissertation Research

ght Sciences*

Ap S 211: Mathematical Methods in Applied Science I
Ap S 213: Mathematical Methods in Applied Science III
Ap S 215: Mathematical Methods in Applied Science V
ES 284: Numerical Methods in Engineering
ME 215: Theory of Vibrations
ME 221: Intermediate Fluid Mechanics
ME 222: Applied Fluid Dynamics
ME 223: Aeroelasticity
ME 227: Viscous Flow
ME 235: Compressible Flow
*ME 248: Seminar: Aircraft Design
*ME 270: Aerodynamics of Flight Vehicles
*ME 271: Flight Dynamics of V/STOL Aircraft
*ME 272: Stability and Control of V/STOL Aircraft
*ME 273: Principles of Automatic Flight Control
*ME 274: Principles of Flight Guidance
ME 275: Stability and Control of Vehicles
*ME 279: Special Topics in Flight Sciences
ME 298: Research
299–300: Thesis Research
ME 312: Theory of Turbulence
ME 315: Hypersonic Flow
ME 398: Advanced Reading and Research
ME 399: Dissertation Research

d Mechanics and Thermal Sciences

Ap S 211: Mathematical Methods in Applied Science I
Ap S 212: Mathematical Methods in Applied Science II
Ap S 213: Mathematical Methods in Applied Science III
Ap S 214: Mathematical Methods in Applied Science IV
Ap S 215: Mathematical Methods in Applied Science V
CE 212: Engineering Climatology
CE 256: Introduction to Ocean and Coastal Engineering
CE 259: Theory of Ship Motions and Sea Loads
CE 268: Applied Marine Hydromechanics

ed at NASA-Langley Research Center; may be offered on campus when arranged.

CE 271:	Theoretical Marine Hydromechanics
CE 274:	Mechanics of Water Waves
CE 275:	Special Topics in Ocean Engineering
EE 133:	Electromagnetic Waves
EE 236:	Plasma Dynamics
ES 228:	Physical Oceanography
ME 218:	Design of Floating and Submerged Marine Vehicles
ME 221:	Intermediate Fluid Mechanics
ME 222:	Applied Fluid Dynamics
ME 223:	Aeroelasticity
ME 227:	Viscous Flow
ME 231:	Hydrodynamics
ME 235:	Compressible Flow
ME 280:	Advanced Thermodynamics
ME 281:	Nonequilibrium Thermodynamics
ME 287:	Heat Conduction
ME 288:	Convective Heat and Mass Transfer
ME 289:	Radiative Heat Transfer
ME 291–92:	Power Systems
ME 295:	Statistical Thermodynamics
ME 297:	Special Topics in Fluid Mechanics
ME 298:	Research
ME 299–300:	Thesis Research
ME 310:	Mechanics of Non-Newtonian Fluids
ME 311:	Nonsteady Flow
ME 312:	Theory of Turbulence
ME 315:	Hypersonic Flow
ME 317:	Physical Gas Dynamics
ME 398:	Advanced Reading and Research
ME 399:	Dissertation Research

Geotechnics and Foundation Engineering

Ap S 211:	Mathematical Methods in Applied Science I
Ap S 213:	Mathematical Methods in Applied Science III
CE 204:	Applied Soil Mechanics I
CE 205:	Applied Soil Mechanics II
CE 206:	Foundation Engineering
CE 207:	Special Topics in Soil Mechanics
CE 208:	Rock and Ice Mechanics
CE 209:	Theoretical Soil Mechanics
CE 217:	Water Resources Engineering I
CE 218:	Water Resources Engineering II
CE 219:	Groundwater and Seepage
CE 256:	Introduction to Ocean and Coastal Engineering
CE 257:	Harbor and Coastal Engineering I
CE 298:	Research
CE 299–300:	Thesis Research
CE 398:	Advanced Reading and Research
CE 399:	Dissertation Research
ES 221:	Theory of Elasticity I
ES 256:	Introduction to the Theories of Inelastic Media
ES 285:	Finite Element Methods in Engineering Mechanics
*Geol 128:	Geomorphology
*Geol 147:	Chemical Geology in the Earth and Ocean Sciences
*Geol 163:	Sedimentation

* For Geology course descriptions, see the *Undergraduate and Graduate Catalogue.*

*Geol 189: Geophysics of the Solid Earth
*Geol 224: Advanced Structural Geology

Hydromechanics

Ap S 211: Mathematical Methods in Applied Science I
Ap S 212: Mathematical Methodis in Applied Science II
Ap S 213: Mathematical Methods in Applied Science III
Ap S 214: Mathematical Methods in Applied Science IV
Ap S 215: Mathematical Methods in Applied Science V
CE 212: Engineering Climatology
CE 256: Introduction to Ocean and Coastal Engineering
CE 259: Theory of Ship Motions and Sea Loads
CE 268: Applied Marine Hydromechanics
CE 271: Theoretical Marine Hydromechanics
CE 274: Mechanics of Water Waves
CE 275: Special Topics in Ocean Engineering
CE 298: Research
CE 299–300: Thesis Research
CE 398: Advanced Reading and Research
CE 399: Dissertation Research
EE 236: Plasma Dynamics
ES 228: Physical Oceanography
ES 284: Numerical Methods in Engineering
ME 218: Design of Floating and Submerged Marine Vehicles
ME 221: Intermediate Fluid Mechanics
ME 222: Applied Fluid Dynamics
ME 227: Viscous Flow
ME 231: Hydrodynamics
ME 297: Special Topics in Fluid Mechanics
ME 310: Mechanics of Non-Newtonian Fluids
ME 311: Nonsteady Flow

Mechanical Engineering Design

CS 284: Applications of Numerical Methods
ES 282: Computer-aided Design
ES 283: Application of Computer Graphics in Engineeering
ME 161: Advanced Dynamics
ME 218: Design of Floating and Submerged Marine Vehicles
ME 221: Intermediate Fluid Mechanics
ME 225: Turbomachinery I
ME 226: Turbomachinery II
ME 240: Kinematic Synthesis
ME 241: Engineering Systems Design
ME 243: Advanced Mechanical Engineering Design
ME 246: Electromechanical Control Systems
ME 247: Fluidics
ME 250: Design of Complex Systems
ME 251–52: Transportation
ME 253: Vehicular Performance
ME 298: Research
ME 299–300: Thesis Research

*For Geology course descriptions, see the *Undergraduate and Graduate Catalogue.*

Ocean and Marine Engineering

Ap S 211: Mathematical Methods in Applied Science I
Ap S 213: Mathematical Methods in Applied Science III
Ap S 214: Mathematical Methods in Applied Science IV
CE 203: Prestressed Concrete Structures
CE 206: Foundation Engineering
CE 207: Special Topics in Soil Mechanics
CE 208: Rock and Ice Mechanics
CE 217: Water Resources Engineering I
CE 218: Water Resources Engineering II
CE 219: Groundwater and Seepage
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 256: Introduction to Ocean and Coastal Engineering
CE 257: Harbor and Coastal Engineering I
CE 258: Harbor and Coastal Engineering II
CE 259: Theory of Ship Motions and Sea Loads
CE 260: Statistical Theory for Ship Hull Performance Prediction
CE 268: Applied Marine Hydromechanics
CE 271: Theoretical Marine Hydromechanics
CE 274: Mechanics of Water Waves
CE 275: Special Topics in Ocean Engineering
CE 298: Research
CE 299–300: Thesis Research
CE 398: Advanced Reading and Research
CE 399: Dissertation Research
ES 228: Physical Oceanography
*Geol 181: General Oceanography
*Geol 241: Geochemistry
*Geol 282: Oceanography
ME 218: Design of Floating and Submerged Marine Vehicles
ME 231: Hydrodynamics

Public Works Engineering

CE 201: Design of Metal Structures
CE 202: Design of Reinforced Concrete Structures
CE 203: Prestressed Concrete Structures
CE 206: Foundation Engineering
CE 208: Rock and Ice Mechanics
CE 211: Engineering Aspects of Waste Control
CE 212: Engineering Climatology
CE 215: Urban Construction Technology
CE 217: Water Resources Engineering I
CE 218: Water Resources Engineering II
CE 219: Groundwater and Seepage
CE 220: Urban Transportation Engineering
CE 221: Pavement and Runway Design
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 256: Introduction to Ocean and Coastal Engineering
CE 257: Harbor and Coastal Engineering I
CE 258: Harbor and Coastal Engineering II
E Ad 204: Administration of Engineering Contracts
E Ad 210: Engineering Law
E Ad 241: Construction Management I
E Ad 242: Construction Management II

* For Geology course descriptions, see the *Undergraduate and Graduate Catalogue.*

E Ad 243: Construction Management III
E Ad 261: Economic Analysis in Engineering Planning

Risk Assessment and Assurance Technology

Prerequisite: Ap S 115, Stat 191*. At least five courses must be selected from those listed under the Department of Civil, Mechanical, and Environmental Engineering; at least three from those listed under Operations Research; and at least one from those listed under Economics. Courses marked with the dagger symbol (†) are required of all students. The selection of elective courses depends on the emphasis for specific technological areas.

Civil, Mechanical, and Environmental Engineering

CE 212: Engineering Climatology
CE 223: Traffic Engineering
†CE 253: Failure and Reliability Analysis of Engineering Structures
CE 256: Introduction to Ocean and Coastal Engineering
CE 260: Statistical Theory for Ship Hull Performance Prediction
CE 299–300: Thesis Research
ES 240: Fracture Mechanics
ES 241: Fatigue
ME 253: Vehicular Performance
ME 261: Fundamentals of Environmental Control I

Operations Research

OR 261: Theory of Games
†OR 271: Forecasting Techniques
†OR 281: Reliability Theory I
†OR 361: Games, Decision, and Value Theory
OR 381: Reliability Theory II

*Economics**

Econ 217–18: Survey of Economics
Econ 275: Econometrics I: Introduction
Econ 315: Seminar: Topics in Mathematical Economics

Solid Mechanics and Materials Engineering

Ap S 211: Mathematical Methods in Applied Science I
Ap S 212: Mathematical Methods in Applied Science II
Ap S 213: Mathematical Methods in Applied Science III
Ap S 214: Mathematical Methods in Applied Science IV
Ap S 215: Mathematical Methods in Applied Science V
CE 208: Rock and Ice Mechanics
CE 209: Theoretical Soil Mechanics
CE 252: General Structural Dynamics
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 261: Analysis of Plates and Shells
ES 217: Analytical Mechanics
ES 221: Theory of Elasticity I
ES 222: Theory of Elasticity II
ES 232: Advanced Materials Science
ES 233: Superconductivity and Electron Transport
ES 234: Composite Materials
ES 235: Physical Metallurgy
ES 236: Wave Propagation in Solids

*For Economics and Statistics course descriptions, see the *Undergraduate and Graduate Catalogue.*

ES 240: Fracture Mechanics
ES 241: Fatigue
ES 256: Introduction to the Theories of Inelastic Media
ES 259: Nonlinear Mechanics of Continua
ES 284: Numerical Methods in Engineering
ES 285: Finite Element Methods in Engineering Mechanics
ES 298: Research
ES 299–300: Thesis Research
ES 398: Advanced Reading and Research
ES 399: Dissertation Research
ME 215: Theory of Vibrations
ME 216: Structural Dynamics
ME 221: Intermediate Fluid Mechanics
ME 280: Advanced Thermodynamics
ME 281: Nonequilibrium Thermodynamics

Structural Engineering

Ap S 211: Mathematical Methods in Applied Science I
Ap S 213: Mathematical Methods in Applied Science III
Ap S 214: Mathematical Methods in Applied Science IV
CE 201: Design of Metal Structures
CE 202: Design of Reinforced Concrete Structures
CE 203: Prestressed Concrete Structures
CE 206: Foundation Engineering
CE 210: Methods of Structural Analysis
CE 213: Structural Design for Dynamic Loads
CE 215: Urban Construction Technology
CE 252: General Structural Dynamics
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 254: Special Topics in Structural Mechanics
CE 256: Introduction to Ocean and Coastal Engineering
CE 257: Harbor and Coastal Engineering I
CE 258: Harbor and Coastal Engineering II
CE 261: Analysis of Plates and Shells
CE 262: Design of Plate and Shell Structures
CE 263: Theory of Structural Stability
CE 298: Research
CE 299–300: Thesis Research
CE 398: Advanced Reading and Research
CE 399: Dissertation Research
ES 221: Theory of Elasticity I
ES 234: Composite Materials
ES 240: Fracture Mechanics
ES 241: Fatigue
ES 256: Introduction to the Theories of Inelastic Media
ES 282: Computer-aided Design
ES 283: Application of Computer Graphics in Engineering
ES 284: Numerical Methods in Engineering
ES 285: Finite Element Methods in Engineering Mechanics

Transportation Engineering

OPTION I: TECHNOLOGY OF THE VEHICLE

CE 201: Design of Metal Structures
CE 210: Methods of Structural Analysis

CE 220: Urban Transportation Engineering
CE 252: General Structural Dynamics
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 259: Theory of Ship Motions and Sea Loads
CE 260: Statistical Theory for Ship Hull Performance Prediction
CE 261: Analysis of Plates and Shells
CE 263: Theory of Structural Stability
ES 241: Fatigue
ME 215: Theory of Vibrations
ME 218: Design of Floating and Submerged Marine Vehicles
ME 222: Applied Fluid Dynamics
ME 223: Aeroelasticity
ME 225: Turbomachinery I
ME 226: Turbomachinery II
ME 237: Propulsion I
ME 238: Propulsion II
ME 241: Engineering Systems Design
ME 243: Advanced Mechanical Engineering Design
ME 246: Electromechanical Control Systems
ME 250: Design of Complex Systems
ME 251–52: Transportation
ME 253: Vehicular Performance
ME 255–56: Urban Transportation Technology
ME 275: Stability and Control of Vehicles
ME 286: Special Topics in Mechanical Engineering
ME 298: Research
ME 299–300: Thesis Research
ME 398: Advanced Reading and Research
ME 399: Dissertation Research
*U&RP 208: Urban Transportation Planning
*U&RP 209: Urban Transportation Models

OPTION II: THE WAY (ROUTE STRUCTURES AND FACILITIES)

CE 201: Design of Metal Structures
CE 202: Design of Reinforced Concrete Structures
CE 203: Prestressed Concrete Structures
CE 204: Applied Soil Mechanics I
CE 205: Applied Soil Mechanics II
CE 206: Foundation Engineering
CE 207: Special Topics in Soil Mechanics
CE 209: Theoretical Soil Mechanics
CE 210: Methods of Structural Analysis
CE 219: Groundwater and Seepage
CE 220: Urban Transportation Engineering
CE 221: Pavement and Runway Design
CE 222: Stations and Terminals
CE 223: Traffic Engineering
CE 252: General Structural Dynamics
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 256: Introduction to Ocean and Coastal Engineering
CE 257: Harbor and Coastal Engineering I
CE 258: Harbor and Coastal Engineering II
ES 240: Fracture Mechanics

* For Urban and Regional Planning course descriptions, see the *Undergraduate and Graduate Cata-*
logue.

ES 241: Fatigue
ES 298: Research
ES 299–300: Thesis Research
ES 398: Advanced Reading and Research
ES 399: Dissertation Research
ME 251–52: Transportation
ME 255–56: Urban Transportation Technology
OR 231: Theory of Traffic Flow
*U&RP 208: Urban Transportation Planning
*U&RP 209: Urban Transportation Models

OPTION III: TRANSPORTATION SYSTEMS†

CE 220: Urban Transportation Engineering
CE 223: Traffic Engineering
E Ad 281–82: Systems Analysis and Management
‡Law 349: Local Government Law
‡Law 372: Administrative Law
‡Law 407: Seminar: Regulation of Transportation I
‡Law 408: Seminar: Regulation of Transportation II
‡Law 492: Seminar: Science and the Legal Process
‡Law 501: Land Development Law
‡Law 505: Intergovernmental Relations I
‡Law 506: Intergovernmental Relations II
ME 251–52: Transportation
ME 255–56: Urban Transportation Technology
ME 298: Research
ME 299–300: Thesis Research
ME 398: Advanced Reading and Research
ME 399: Dissertation Research
OR 201: Survey of Operations Research Methods I
OR 231: Theory of Traffic Flow
OR 251: Linear Programming
OR 252: Nonlinear and Dynamic Programming
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 277: Queuing Theory
*U&RP 201: Introduction to Urban Planning
*U&RP 208: Urban Transportation Planning
*U&RP 209: Urban Transportation Models
*U&RP 210: Urban Development Economics

Urban Environmental Engineering

CE 201: Design of Metal Structures
CE 202: Design of Reinforced Concrete Structures
CE 203: Prestressed Concrete Structures
CE 204: Applied Soil Mechanics I
CE 206: Foundation Engineering
CE 211: Engineering Aspects of Waste Control
CE 215: Urban Construction Technology
CE 217: Water Resources Engineering I
CE 218: Water Resources Engineering II

* For Urban and Regional Planning course descriptions, see the *Undergraduate and Graduate Cat*
logue.
† Prerequisite courses for admission to this option are Ap S 115 and Stat 191 (See the *Undergraduate and Graduate Catalogue*).
‡ For Law course descriptions, see the *National Law Center* catalogue.

CE 219: Groundwater and Seepage
CE 220: Urban Transportation Engineering
CE 223: Traffic Engineering
E Ad 204: Administration of Engineering Contracts
E Ad 207: The Personnel Function for Engineering Administrators
E Ad 210: Engineering Law
E Ad 261: Economic Analysis in Engineering Planning
ME 251–52: Transportation
ME 255–56: Urban Transportation Technology
ME 261: Fundamentals of Environmental Control I
ME 262: Fundamentals of Environmental Control II
ME 263: Environmental Control Processes I
*U&RP 204: Urban Development Planning
*U&RP 205: Urban Housing
*U&RP 207: Land Development Planning
*U&RP 208: Urban Transportation Planning

CIVIL ENGINEERING COURSES

201 Design of Metal Structures (3)

Structural behavior and failure of metal structures; conception and design of structural systems for various cases, including low- and high-rise buildings, long-span structures, bridges, suspended roofs, and special structures. Prerequisite: CE 191 or equivalent. (Fall)

202 Design of Reinforced Concrete Structures (3)

Modes of failure of reinforced concrete structures; selection of appropriate structural system; design of slabs, frames, folded plate roofs, shell structures, and other special structures. Prerequisite: CE 192 or equivalent. (Fall)

203 Prestressed Concrete Structures (3)

Structural behavior and failure modes of prestressed concrete structures; design in prestressed concrete, including long-span structures, bridges, and precast systems. Prerequisite: CE 202 or equivalent. (Spring)

204 Applied Soil Mechanics I (3)

Theories of soil strength; bearing capacity of shallow foundations and their design; deep foundations, including pile types and design criteria; theories of lateral earth pressure with applications; stability analyses of slopes. Selected experiments in the soil mechanics laboratory. Prerequisite: CE 168 or equivalent. (Spring)

205 Applied Soil Mechanics II (3)

Nature of soil, including geological and pedological aspects; flow of water in soil; seepage involving foundations, dams, and wells; stress distribution in earth masses; one- and three-dimensional theories of consolidation; analysis of settlement. Selected experiments in the soil mechanics laboratory. Prerequisite: approval of Department. (Fall)

206 Foundation Engineering (3)

Principles of soil mechanics and structural mechanics applied to the analysis and design of spread footings and mat foundations, pile founda-

*For Urban and Regional Planning course descriptions, see the *Undergraduate and Graduate Catalogue*.

tions, retaining structures, including sheeting and bracing systems, and waterfront structures. Problems associated with subsurface exploration, dewatering excavations, and underpinning. Prerequisite: CE 182, 204; or equivalent. (Spring)

207 **Special Topics in Soil Mechanics** (3)
Selected topics in soil mechanics of current interest, such as soil rheology, soil dynamics, computer applications, excavation with nuclear explosives, and ocean bottom sediments. May be repeated for credit. Prerequisite: approval of Department. (Fall)

208 **Rock and Ice Mechanics** (3)
Classification, composition, and structure of rocks; elastic and rheological properties; fracture; effect of hydrostatic pressure and temperature; effect of water; strain measurement and testing. Classification, composition, and structure of ice; deformation flow and fracture. Engineering, geophysical, and geological applications. Prerequisite: ES 221 or 256; or equivalent. (Spring)

209 **Theoretical Soil Mechanics** (3)
Mechanics of continua and their relation to and application in soil mechanics; theories of failure and stability; theories of consolidation; problems of seepage. Prerequisite: CE 204 or equivalent. (Fall)

210 **Methods of Structural Analysis** (3)
Classical and modern methods of analysis of statically indeterminate structures, including matrix analysis, variational methods, finite elements, theory of plastic collapse and shakedown. Prerequisite: graduate status. (Fall)

211 **Engineering Aspects of Waste Control** (3)
Hydraulics and design of sewer systems; sewage treatment and sewage disposal; control of industrial and nuclear wastes; biological, chemical, and related physical processes. Prerequisite: CE 197 or equivalent. (Fall)

212 **Engineering Climatology** (3)
Constitution of physical properties of earth and atmosphere, stability conditions, energy-balance characteristics, atmospheric motions, storm-forecasting models, tree-ring analysis, evaporation, precipitation and fog formation, soil moisture and ground frost. Prerequisite: approval of Department. (Spring)

213 **Structural Design for Dynamic Loads** (3)
Design of structures for dynamic and impact forces; wind loads, wave forces, earthquake and blast loads; design of structural elements in concrete and steel; details of connections; discussion of specific problems. Prerequisite: CE 201, 202; or equivalent. (Spring)

215 **Urban Construction Technology** (3)
Modern designs and construction techniques for the city, modular construction, construction management and planning. Prerequisite: approval of Department. (Spring)

217 **Water Resources Engineering I** (3)
Hydrology; open-channel flow with application to navigation, irrigation, water power; water supply and distribution. Prerequisite: CE 193 or equivalent. (Fall)

218 **Water Resources Engineering II** (3)

Groundwater; pollution and sanitation in sewers, lakes, estuaries; water-resources planning; special problems. Prerequisite: CE 193 or equivalent. (Spring)

219 **Groundwater and Seepage** (3)

Permeability theory or groundwater flow, flownets, analogs, computer solutions; applications to engineering problems such as excavation dewatering, flow through dams, stabilization of earth slopes. Prerequisite: Ap S 211 and concurrent registration in Ap S 213 (or an equivalent course in Mathematics). (Fall)

220 **Urban Transportation Engineering** (3)

Introduction to urban transportation planning. Analysis of urban transportation requirements. Evaluation procedure for the selection between alternative solutions. Prerequisite: approval of Department. (Fall)

221 **Pavement and Runway Design** (3)

Pavement types, wheel-load characteristics; stresses in pavements and subgrades based on elastic and viscoelastic theories; empirical methods of design of flexible and rigid highway and airfield pavements; general principles of runway design. Prerequisite: CE 202, 204; ES 221. (Spring)

222 **Stations and Terminals** (3)

Unified treatment of the functions and operation of stations and terminals of transportation systems; emphasis on specifications and planning criteria applicable to most existing and foreseeable modes. Problems of locating the facility, planning it as a subsystem of the transportation system, passenger and freight handling, intra-modal and inter-modal interfacing, communication and control. Illustrations include railroad and subway stations, bus terminals, airports, and harbors. Prerequisite: approval of Department. (Spring)

223 **Traffic Engineering** (3)

Problems of traffic forecasting and planning for the various modes of transportation. Impact on and interaction with urban planning. Prerequisite: Ap S 115 or equivalent and approval of Department. (Fall)

252 **General Structural Dynamics** (3)

Analysis of elastic structures under dynamic loadings—steady-state, transient, and stochastic; vibrations of rigid frames, plates, and thin shells. Stochastic load processes—wind, earthquake, sea; failure under stochastic loading—first exceedance, damage accumulation. Prerequisite: Ap S 115 or equivalent and approval of Department. (Spring)

253 **Failure and Reliability Analysis of Engineering Structures** (3)

(Formerly CE 196)

Operational and structural failure mechanisms; instability, fracture, and fatigue. Operational and structural safety, probability of failure. Aspects of probabilistic structural analysis, statistics of extremes, risk and reliability, optimal design criteria. Prerequisite: Ap S 115 or equivalent. (Fall)

254 **Special Topics in Structural Mechanics** (3)

Selected problems in structural mechanics, including thermal stresses in one- and two-dimensional structures, impact of elastic bodies, and other

current topics of interest. Prerequisite: CE 210 or approval of Department. (As arranged)

256 **Introduction to Ocean and Coastal Engineering** (3)

Application of wave mechanics to the analysis of wave motion in coastal and offshore regions: reflection, diffraction, refraction. Wave spectra: procurement of spectral data by direct measurement or from hind-casting techniques. Beaches and littoral drift, mixing processes, outfalls and intakes in the oceans and estuaries, outfall and intake design, wave forces on coastal and offshore structures, harbor oscillations, tides in estuaries. Prerequisite: Ap S 115, ME 221; or equivalent. (Spring)

257 **Harbor and Coastal Engineering I** (3)

Waves and swells, tides and currents, coastal regime, estuaries and deltas, structures for coastal protection, principles of harbor navigation, harbor planning and harbor design, breakwaters and sea walls, quays, docks, internal access structures; maintenance of external and internal access, dredging. Prerequisite: CE 256. (Fall)

258 **Harbor and Coastal Engineering II** (3)

Interaction between structures and waves. Analysis and design of flexible structures: piers, jetties, and protective structures; off-shore drilling platforms. Design criteria, moorings and cables, harbor operations equipment. Prerequisite: CE 257; and CE 252 or equivalent. (Spring)

259 **Theory of Ship Motions and Sea Loads** (3)

Equations of motion for a body in an infinite fluid. Hydrodynamics of bodies oscillating in calm water. Two-dimensional added mass and damping for cylinders in the free surface. Forces and moments on a fixed body in waves (the diffraction problem). Linear-strip theory for six degrees of freedom motions for ships and ocean structures in regular waves. Nonlinear-roll motions. Dynamic loads on floating vehicles and fixed structures in a seaway. Prerequisite: CE 268, 271; or equivalent. (Spring)

260 **Statistical Theory for Ship Hull Performance Prediction** (3)

Basic principles and concepts of spectral analysis, probability theory, and related topics necessary for the statistical prediction of ocean waves, ship motions, and stresses in a seaway. Linear systems superposition principle and cross-spectral analysis. Distribution of envelope of a narrow-band random process and random sample (observation) and estimation. Long-term prediction, prediction of extreme values, time-domain analysis and transient wave-test technique. Prerequisite: approval of Department. (Spring)

261 **Analysis of Plates and Shells** (3)

Bending and stretching of thin elastic plates under loading with various boundary conditions, continuous plates and plates on elastic foundations, theory of folded plate structures. Theory of curved surfaces; general linear bending theory and its simplification to membrane theory; bending stresses in shells of revolution, shallow shell theory. Specific applications. Prerequisite: graduate status. (Fall)

262 **Design of Plate and Shell Structures** (3)

Design of long-span plate and shell roof structures in reinforced concrete and metal; design of containers for fluids and granular materials; com-

puter applications in the analysis of such structures. Prerequisite: CE 201, 202, 261; or equivalent. (Spring)

263 **Theory of Structural Stability** (3)

General criteria for stability; buckling of elastic and inelastic columns and frames; torsional and lateral buckling; variational methods. Buckling of plates and shells under static loads; stability of stiffened structures; effect of imperfections and boundary conditions. Prerequisite: graduate status. (Spring)

268 **Applied Marine Hydromechanics** (3)

Introductory course; emphasis on experimental methods, dealing with the application of hydrodynamics to problems relating to the design and performance of ships in the following areas: ship hydrostatics (terminology and concepts), ship resistance (viscous, form, and wave drag), propulsion (screws and other propulsors), dynamics of floating vehicles (maneuvering and control, ship motion in a seaway). Special attention in each area to solving problems related to unusual, as well as conventional, marine vehicles. Prerequisite: approval of Department. (Fall)

271 **Theoretical Marine Hydromechanics** (3)

Introductory course designed to acquaint the student with some physical concepts and mathematical tools of theoretical marine hydromechanics. Derivation of the fundamental equations and boundary conditions of a fluid media; application of potential flow theory to fluid motion around two- and three-dimensional bodies; perturbation concepts. Introduction to thin-ship and slender-body theories. Derivation of force and moment of bodies moving in calm and disturbed water. Prerequisite: approval of Department. (Fall)

273 **Membrane Processes for Water Treatment** (3)

Survey of different membrane separation processes, including reverse osmosis, electrodialysis, ultrafiltration, dialysis, and others. Process fundamentals and equipment requirements. Application to water problems; desalting, upgrading of municipal water supplies, waste water reclamation and recycling, depollution of industrial waste waters, and water reuse. System analysis, process selection, and plant design; parametric analysis and process optimization, pretreatment and waste disposal, economic considerations. Prerequisite: CE 217 or equivalent. (Spring)

274 **Mechanics of Water Waves** (3)

Basic concepts. Infinitesimal waves: irrotational theory for deep- and shallow-water waves, reflexion, refraction, diffraction, attenuation. Water waves of finite amplitude: airy nonlinear shallow-water theory, tides, bores, long-waves theory, conoidal and solitary waves, kinematic waves, mass transport. Wave generation by wind: resonance, shear-flow, and maser mechanisms; state-of-the-art based on correlation between theory and measurements. Interfacial (internal) waves. Wave-breaking and reflexion. Prerequisite: ME 221 or equivalent and permission of instructor. (Fall)

275 **Special Topics in Ocean Engineering** (3)

Advanced problems in physical oceanography and hydromechanics. Tides and ocean waves, oceanography of estuaries and deltas, currents and coastal regimes, wind waves in coastal waters, wave diffraction and reflection, clapotis, ocean pollution control, ice forces. Prerequisite: approval of Department. May be repeated for credit. (As arranged)

298 **Research** (arr.)
Basic research projects, as arranged. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)
(Fall and spring)

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

MECHANICAL ENGINEERING COURSES

201 **Mechanical Measurement** (3)
Precise measurements of mass and length, mechanical and interferometric methods. Prerequisite: approval of Department. (Fall—evening)

202 **Heat Measurement** (3)
Temperature scales; measurement by resistance thermometry, thermocouples, pyrometry, vapor pressure thermometry; heat transfer quantities and their measurement; calorimeters, flow calorimeters. Prerequisite: approval of Department. (Fall—evening)

203 **Pressure Measurement** (3)
Experimental techniques for quantitative measurement of pressure; working gages, standards, calibration procedures; methods and apparatus for observations near atmospheric pressure, in the high pressure range and in the vacuum range. Prerequisite: approval of Department. (Spring—evening)

215 **Theory of Vibrations** (3)
Damped and undamped natural vibrations, transient response and response to harmonic and periodic excitation, natural vibration of discrete and continuous systems; integral formulation of eigenvalue problems, response by modal analysis, approximate methods, influence of secondary effects and constraints, damped systems. Prerequisite: approval of Department. (Fall)

216 **Structural Dynamics** (3)
Methods of solving vibration problems: differential equation, Rayleigh-Ritz finite element. Free and forced vibration of structural components: straight, curved, and thin-walled beams; plates and shells; sandwich construction. Vibration of built-up structures. Structural wave motion, wave motion in periodic structures. Prerequisite: ME 215. (As arranged)

218 **Design of Floating and Submerged Marine Vehicles** (3)
Consideration of interaction between hydrodynamics, propulsion, and configuration aspects of design of floating structures and vehicles; effects of submergence and deep submergence; hydrofoil and vertical jet action; structural considerations. Prerequisite: ES 228. (Fall)

221 **Intermediate Fluid Mechanics** (3)

The continuum, kinematics of fluids; stress tensor, strain and rate-of-strain tensor; fundamental equations of the flow of viscous compressible fluids; Laplace's equations; source, sink, and doublet; vortices, Biot-Savart theorem and the flow field of a vortex; spherical and cylindrical harmonics; methods of singularity distributions, complex-variable methods; laminar flow of viscous incompressible fluids; boundary-layer concept. Prerequisite: approval of Department. (Fall)

222 **Applied Fluid Dynamics** (3)

Subsonic lifting line wing theory, direct and inverse solution of the lifting surface theory; singularity method for wing-body combination; vortex lift theory; effects of camber and twist distribution; transonic airfoils, effect of wing sweep, area ruling concept; supersonic linearized wing theory; similarity rules. Prerequisite: ME 221 or equivalent. (Spring)

223 **Aeroelasticity** (3)

Introduction to aeroelastic phenomena; structural deformations of vehicles under static and dynamic loads; vibrations of vehicle structures; static aeroelastic problems (structural deformation, divergence, control effectiveness, and reversal); flutter theory and calculation of flutter boundaries; aerodynamics of steady and nonsteady two-dimensional wings in subsonic, sonic, and supersonic flow; strip theory applications of two-dimensional aerodynamics to three-dimensional lifting surfaces; piston theory and Newtonian-flow theory. Prerequisite: ME 215, 221; or equivalent. (Fall)

224 **Fundamentals of Combustion Engines** (3)

Classification of combustion engines: air cycles, vapor cycles, external combustion engines, internal combustion engines; rotary engines, reciprocating engines, and turbomachinery; ideal cycle analysis; engine heat losses and friction; practical cycle analysis status of computerized cycle analysis; combustion and knocking; carburetion and fuel injection; mixture distribution; valve mechanism; ignition systems; combustion chamber; piston-engine, rotary-engine, and turbomachinery mechanics and balance. Prerequisite: approval of Department. (Fall)

225 **Turbomachinery I** (3)

Review of thermodynamic principles; fundamentals of fluid flow; hydraulic power systems; steam and gas turbine cycles; turbine, compressor, and pump types; energy interchange in fluid machinery; design and characteristics of turbines, compressors, and pumps; linking of compressor and compressor turbine characteristics; combustion systems; regenerators. Prerequisite: approval of Department. (Fall)

226 **Turbomachinery II** (3)

Aerodynamics of aerofoils, flow in cascades, data for turbine calculations, axial turbine aerodynamic design, performance of compressor cascades, axial compressor aerodynamic design. Heat and mass transfer with chemical reaction, combustion of liquid fuels, combustion in premixed gases, combustion without premixing, gas-turbine combustion chamber design. Prerequisite: ME 225. (Spring)

227 **Viscous Flow** (3)

Exact solutions of Navier-Stokes equations; the small Reynolds number approximations, laminar boundary-layer theory and the techniques for its

solution, stability of laminar flows; Reynolds theory of turbulent stresses, applications to internal and external flows, turbulent boundary-layer theory; applications to heat transfer problems; flow separation. Prerequisite: Ap S 213; ME 221 or equivalent. (Fall)

231 **Hydrodynamics** (3)

Flow at large Reynolds number: vorticity dynamics, Kelvin's theorem in inviscid flow, vorticity in motions generated from rest, boundary layers, applications of the momentum theorem. Irrotational flow theory: applications of Bernoulli and momentum theorems to steady flows, flow due to a rigid body, two-dimensional motion and applications of complex variable theory, free surface flows, Froude numbers, criterion of dynamic similarity. Effectively inviscid flow with vorticity: sheet vortex, flow with swirl, vortex system of a wing. Prerequisite: ME 221 or equivalent. (Spring)

235 **Compressible Flow** (3)

Thermodynamics and physical properties of gases, fundamental equations of a compressible inviscid fluid, small perturbation theory, expansions in Mach number and thickness parameters, second-order shock shapes, role of entropy in supersonic flow, shock wave interactions, hodograph transformation, Kármán-Tsien and other model gases, conical flows, transonic flow theory, method of characteristics, rotational nonisentropic flows. Prerequisite: Ap S 213; ME 221 or equivalent. (Spring)

237 **Propulsion I** (3)

Basic concepts of propulsion: energy transformations in propulsive flows; gas dynamics of combustion, detonation processes; nonuniform flows, mixing; intakes, additive drag; mechanics of flow induction; drag and thrust generation; multiple-flow thrust generators; thrust recovery and augmentation; the propulsion spectrum. Illustrative examples will include propellers, turbojets, turbofans, ramjets, and rockets. Prerequisite: approval of Department. (Spring)

238 **Propulsion II** (3)

Advanced propulsion concepts: nonsteady flows with viscosity, heat exchanges, and entropy gradients; discontinuities and interactions in nonsteady flow; gas dynamics of nonsteady combustion; static, dynamic, and cryptosteady pressure exchange; energy equalizers and dividers; nonsteady-flow thrust generators. Topics for discussion will include a variety of new flow induction and propulsion concepts. Prerequisite: ME 237. (Fall)

240 **Kinematic Synthesis** (3)

Determination of linkage proportions from prescribed input-output conditions for both path and function-generating mechanisms; critical comparison of graphical, analytical, and computer-oriented methods. Techniques are applied to the synthesis of various machines and computers. Prerequisite: approval of Department. (Spring)

241 **Engineering Systems Design** (3)

Principles of system design; interdisciplinary system simulation for mechancial, electrical, fluid, and thermal sciences; dynamic response of systems; mathematical model and analogy studies; optimization techniques with computer-aided solutions. Prerequisite: approval of Department. (Fall)

243 **Advanced Mechanical Engineering Design** (3)

Design of mechanical engineering systems, components, and equipment; requires the integration of engineering disciplines at an advanced level. Prerequisite: approval of Department. (Fall)

246 **Electromechanical Control Systems** (3)

System synthesis, compensation, and stabilization using Bode diagrams, root locus, etc.; linear and nonlinear characterization of mechanical, electromechanical, and electronic control components. Prerequisite: approval of Department. (Fall)

247 **Fluidics** (3)

Introduction of fluidic components and systems: behavior and modeling of bistable and proportional jet devices, vortex amplifiers and sensors, passive elements, transmission lines; system synthesis, coupling effects. Survey of current applications and research. Prerequisite: approval of Department. (Spring)

*248 **Seminar: Aircraft Design** (3)

Problem of designing an aircraft to certain specifications. Regulatory restraints and requirements, state-of-the-art limitations, computer-aided design, integration of aircraft components, economic considerations, and iterations to final configuration to obtain specified mission profile. Prerequisite: approval of Department.

250 **Design of Complex Systems** (3)

Discussion of frontier problems such as salt water conversion, transportation devices and systems, systems for space and underwater exploration. Determination of specifications for these systems to meet given needs. Critical discussion of possible solutions based on technical as well as economic and social considerations. Prerequisite: approval of Department. (Spring)

251–52 **Transportation** (3–3)

A "workshop" for the study of the problems of urban and interurban transportation; identification of the problems of mass transportation and assessment of alternative solutions. Topics for discussion include the nontechnological requirements and constraints of mass transportation and the technological problems of power supply, propulsion, support and suspension, guidance and control, guideways and stations. Prerequisite: approval of Department. (Academic year)

253 **Vehicular Performance** (3)

Methods of performance analysis and evaluation; optimization of schedules and trajectories. Applications to water, land, air, and space vehicles. Prerequisite: approval of Department. (Fall)

255–56 **Urban Transportation Technology** (3–3)

Problems of headway and capacity for modern transit systems and their relationships to control systems, braking, station design, and system management. Urban vehicle design, including propulsion systems, suspension, steering, and switching. System evaluation techniques for technical performance and economic evaluation of new concepts. Prerequisite: approval of Department. (Academic year)

260 **Heating, Refrigeration, and Air Conditioning** (3)

Fluid flow and heat transfer; heating and cooling load calculations; design of heating and cooling distribution systems; design and characteristics of evaporator, condenser, expander, and compressor. Methods of refrigeration and air condition: vapor-compression refrigeration, absorption re-

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

frigeration, steam jet refrigeration, thermo-electric refrigeration, low-temperature refrigeration, heat pumps, basic air-standard cycles, regenerative and bootstrap air cycles. Method of heating: warm-air, hot-water, electric-resistance, and solar heating systems and heat pumps. Prerequisite: approval of Department. (Fall)

261 **Fundamentals of Environmental Control I** (3)

Understanding environmental systems, water as natural resources, air as an ecological limiting factor, man's inadvertent modification of weather and climate, solid wastes, noise, pesticides, and radiation, natural resources, utilization of terrestrial ecosystems, international cooperation, citizen participation, environmental needs. Prerequisite: approval of Department. (Fall)

262 **Fundamentals of Environmental Control II** (3)

Directed field investigations; case studies and workshops to document ecological problems associated with power plants, power plant site selection, impoundments, and industrial discharges among others as they relate to the current National Environmental Policy Act of 1970 and the anticipated future national policies. Prerequisite: ME 261 or equivalent. (Spring)

263 **Environmental Control Processes I** (3)

Control of particulates emissions: settling, filtration, cyclonic collection, wet collection, and electrostatic precipitation. Control of gaseous emissions: absorption, adsorption, incineration, and condensation. Design, operation, and current status of air-pollution control processes. Prerequisite: approval of Department. (Spring)

264 **Environmental Control Processes II** (3)

Selected problems in the application of mechanical engineering science to the design of environmental control equipment, i.e., theory of vortex flow, design of vortex equipment for separation of solid and oil suspensions from water; mechanics of air bubbles in water, mechanical generation of air bubbles, design of turbine, jet diffuser, and porus diffuser for aeration systems; thermodynamics and kinetics of combustion, application of combustion theory to design of incineration systems for sludge and solid disposal; theory of mass transfer and its application to hyperfiltration systems. Prerequisite: ME 261, 262; or equivalent. (Fall)

265 **Air-pollution Meteorology** (3)

(Formerly ME 262)

Weather and motion systems of atmosphere; ground- and upper-level air conditions; atmospheric stability and inversions; atmospheric turbulence and diffusion; urban and topographic effects upon meteorological parameters; effects of meteorological parameters upon transportation and diffusion of pollutants; meteorological factors in plant location, design, and operation, and in urban planning. Prerequisite: ME 221 or equivalent. (Fall)

266 **Air-pollutants Sampling and Analysis** (3)

Air and its contaminants, sampling for particulates, sampling for gaseous pollutants, separation of metals and oxides, analysis for organic pollu-

tants, analysis for inorganic pollutants, reference analytical methods, automatic and continuous monitoring. Prerequisite: approval of Department. (Spring)

*270 **Aerodynamics of Flight Vehicles** (3)

Aerodynamic loads on flight vehicles, interference effects, application of aerodynamic theory to aircraft design, studies of aircraft dynamics and performance. Prerequisite: ME 222 or equivalent. (Spring)

*271 **Flight Dynamics of V/STOL Aircraft** (3)

Various configurations of V/STOL aircraft, review of airscrew theory and rotating wing mechanics, dynamics of rotating wing systems, aeroelasticity of rotor blades and analysis of vibrating modes, performance of V/STOL aircraft. Prerequisite: ES 217 or equivalent. (Spring)

*272 **Stability and Control of V/STOL Aircraft** (3)

Static longitudinal stability, longitudinal and lateral dynamic stability, influence of aerodynamic parameters on flight characteristics, transfer function of V/STOL aircraft, effect of feedback on stability of V/STOL aircraft. Prerequisite: ME 271. (Fall)

*273 **Principles of Automatic Flight Control** (3)

Design of aeronautical instrumentation and feedback controls; mathematical models of sensors, controllers, and actuators; theory of feedback control, stability, accuracy, and speed of response; equalization effects of nonlinearities and noise. Prerequisite: approval of Department. (Fall)

*274 **Principles of Flight Guidance** (3)

Guidance requirements for atmospheric flight; implementation of guidance systems using inertial and radio techniques in conjunction with automatic data processing. Prerequisite: ME 273. (Fall)

275 **Stability and Control of Vehicles** (3)

Derivation of equations of motion, Euler transformations and direction cosines, stability derivatives and linearization of equations of motion, stability of linear systems with application to longitudinal and lateral dynamics, Laplace transform techniques and frequency response analysis. Prerequisite: ES 217 or approval of Department. (As arranged)

*276 **Mechanics of Space Flight** (3)

First- and second-order Hamiltonian-Jacobi perturbation theory applied to artificial satellites, von Zeipel's methods, special and general perturbation theories for third-body perturbations. Differential correction of orbits by weighted least squares and minimum variance techniques. Comparison of various filtering techniques as applied to orbit determination and other space flight parameter estimation. Prerequisite: ES 217 or approval of Department. (As arranged)

*279 **Special Topics in Flight Sciences** (3)

Current problems and methods in V/STOL flight dynamics, advanced flight concepts, instrumentation, guidance, and control. Prerequisite: approval of Department. (Spring)

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

280 Advanced Thermodynamics (3)

Statistical significance of the entropy concept, conditions of equilibrium, equilibrium of heterogeneous systems. Application of thermodynamic formalism to magnetic, electric, and solid systems; equilibrium of ionized gases; the Nernst postulate and the third law of thermodynamics. Prerequisite: graduate status. (Fall)

281 Nonequilibrium Thermodynamics (3)

Limitations of equilibrium thermodynamics, entropy production, phenomenological equations and linear laws; postulates of nonequilibrium thermodynamics, formulation of the equations of nonequilibrium systems, statistical foundations, stationary nonequilibrium states; selected applications. Prerequisite: ME 280. (Spring)

282 Energy Technology (3)

Energy resources, trends in energy supply and demand, review for assessment of new energy technology. Central-station power from fossil fuel, economics of steam and gas-steam cycles, MHD power generation, air and thermal pollution. Nuclear power systems: performance characteristics, pollutants and hazards, environmental effects. Trends in the electricity industry, prospects for growth, cost of electricity, power plant size, plant siting, regulatory agencies. Review of unconventional energy conversion systems. Prerequisite: ME 148 or equivalent. (Spring)

283 Nuclear Reactor Engineering (3)

Atomic and nuclear structures; neutron, fission, and chain reaction; nuclear reaction and radiation; diffusion and slowing down of neutrons; criticality condition; reactor theory; reflected reactors; homogeneous reactor systems; heterogeneous reactor systems; fast reactors; control and operation of reactors; reactor design calculations; reactor coolants, flow and heat transfer; radiation protection and reactor shielding; mechanical and structural components of power reactors. Prerequisite: approval of Department. (Spring)

286 Special Topics in Mechanical Engineering (3)

Prerequisite: approval of Department. (As arranged)

287 Heat Conduction (3)

Conduction of heat through solid, liquid, and gaseous media; formulation and methods of analytical, numerical, and analog solutions; steady two- and three-dimensional problems, problems in unsteady heat conduction, conduction in composite regions. Prerequisite: Ap S 213 or equivalent. (Fall)

288 Convective Heat and Mass Transfer (3)

Heat and momentum transfer in laminar and turbulent flow; application of boundary-layer theory to problems of forced convection; the laminar boundary-layer and similarity solutions; heat convection in turbulent flow, momentum-heat transfer analogy; the influence of temperature-dependent fluid properties; convective heat transfer at high velocities; mass transfer, formulation of a simplified theory; some solutions to the conserved property equation. Prerequisite: ME 221 or equivalent. (Spring)

289 **Radiative Heat Transfer** (3)

Nature of thermal radiation; radiative characteristics of surfaces; thermal radiation within evacuated enclosures; configuration factors algebra; solution methods for the integral equations of radiant interchange; enclosures containing an absorbing and emitting medium; absorbing, emitting, and scattering media; combined radiation, conduction, and convection. Prerequisite: Ap S 214 or equivalent. (Fall)

*290 **Kinetic Theory of Gases** (3)

Equation of state and physical properties for gas composed of discrete particles; relation of kinetic theory to thermodynamics; Maxwell distribution of molecular velocities; Boltzmann H theorem. Molecular interactions, free paths, collision rates, scattering coefficients. Introduction to diffusion, viscosity, heat conduction; imperfect gases; flow of gases at low density. Prerequisite: ME 280. (Spring)

291–92 **Power Systems** (3–3)

Design of thermal power system components and system optimization. Steam cycle power generation system components: steam generators, reactor coolant system, condensate and feedwater system, turbine-generator, waste heat removal. Heat balance studies, options for improved cycle efficiencies, system optimization studies, component selection and design, cooling towers, lakes and ponds. Review of safety and pollution regulations; testing, inspection, and codes. Survey of electric power system technology. Prerequisite: ME 148, 187; or equivalent. (Academic year)

*293 **Aerothermochemistry I** (3)

Thermodynamics of reacting systems, combustion kinetics, conservation equations, transport processes, laminar diffusion flames, laminar premixed flames, aspects of reacting inviscid flows. Prerequisite: approval of Department.

*294 **Aerothermochemistry II** (3)

Additional aspects of reacting inviscid flows, reacting boundary layers, heterogeneous combustion, turbulent flames, numerical methods in aerothermochemistry. Prerequisite: ME 293 or equivalent.

295 **Statistical Thermodynamics** (3)

Distribution functions; Boltzmann, Bose-Einstein, and Fermi-Dirac statistics; partition functions, correspondence between classical and statistical thermodynamics. Systems with negligible effects of interparticle forces; perfect gases, perfect electron gas, photon gas. The Debye solid, the Einstein solid. Prerequisite: ME 280. (Spring)

296 **Special Topics in Heat and Mass Transfer** (3)

Prerequisite: approval of Department. (As arranged)

297 **Special Topics in Fluid Mechanics** (3)

Prerequisite: approval of Department. (As arranged)

298 **Research** (arr.)

Research as arranged. May be repeated for credit. (Fall and spring)

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

299–300 Thesis Research (3–3)
(Fall and spring)

310 Mechanics of Non-Newtonian Fluids (3)
Classification of fluids; physical properties of composite fluids; convected coordinate systems; fundamentals of constitutive equations of composite fluids; purely viscous fluids, Reiner and Rivlin theories, power-law fluids; linear theory of viscoelastic fluids, Boltzmann principle, quasi-linear viscoelasticity; nonlinear theory of viscoelasticity, Rivlin-Ericksen theory; viscoplastic fluids, Bingham plastic fluids, Oldroyd's analysis; viscometry and rheogoneometry; turbulent flow of suspensions and emulsions in pipes; frictional drag reduction by polymeric additives. Prerequisite: approval of Department. (Fall)

311 Nonsteady Flow (3)
Fundamental equations of nonsteady viscous flow; frames of reference; Eulerian and Lagrangian methods. Boundary conditions; characteristics and waves, isentropic and nonisentropic disturbances; discontinuities, interactions, special transients. Piston theory and the oscillating airfoil. Nonsteady flows with viscosity and entropy gradients. Prerequisite: ME 235 or equivalent. (Fall)

312 Theory of Turbulence (3)
Concept of turbulence, theory of transition, stability, isotropic turbulence, free turbulence, turbulence shear flows, transport process in turbulent flow. Prerequisite: ME 227. (Fall)

315 Hypersonic Flow (3)
Small-disturbance theory, Newtonian theory; constant-density solution, theory of thin shock layers, flow over blunt bodies, hypersonic viscous flow. Prerequisite: ME 227. (Fall)

317 Physical Gas Dynamics (3)
Molecular and atomic phenomena in gases, intermolecular forces, specific heats, equation of state for a real gas, dynamics of dissociating gas, radiation. Prerequisite: ME 235; ME 295 or equivalent. (Spring)

398 Advanced Reading and Research (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.)
Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

ENGINEERING SCIENCE COURSES

201 History of Technology (3)

***202 Advanced General Metrology** (3)
Topics in the conceptual, physical, and mathematical aspects of measurement, standards, design for precision measurement and measurement at extreme values. Prerequisite: graduate status. (Fall—evening)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

*203–4 **Probability and Statistics of Metrology** (3–3)

Probability distributions, discrete and continuous distributions; sampling; combinatorial analysis; stochastic processes; conditional probability; correlation; analysis of variance; design and analysis of experiments; Latin Square experiments; factorial experiments; block and lattice design. Prerequisite: Ap S 115 or equivalent. (Academic year—evening)

217 **Analytical Mechanics** (3)

Fundamental principles, generalized coordinates, variational principles and Lagrange's equations, nonholonomic systems, Hamilton's equations, theory of small oscillations. Prerequisite or concurrent registration: Ap S 211. (Spring)

220 **Nonlinear Mechanics** (3)

Topological and analytical methods in nonlinear mechanics, nonlinear resonance, relaxation oscillations. Prerequisite: ES 217. (As arranged)

221 **Theory of Elasticity I** (3)

Infinitesimal strain and compatibility; stress, constitutive relations for isotropic solids, displacement and stress formulation of boundary-value problems, energy principles, the reciprocal theorem, elements of pure torsion and flexure of rods; plane problems in elastostatics and dynamics illustrating stress function and Fourier transform methods. Prerequisite: approval of Department. (Fall)

222 **Theory of Elasticity II** (3)

Complex variable methods in plane static and dynamic problems; introduction to three-dimensional elastostatics, displacement potentials of Kelvin, Papkovich, and Galerkin; classical problems of Kelvin, Boussinesq, and Mindlin; Love's strain function and integral transform methods for axially symmetric problems; Somogliana and Betti integrals. Introduction to thermoelasticity. Prerequisite: Ap S 211; Ap S 213 (which may be taken concurrently); ES 221. (Spring)

228 **Physical Oceanography** (3)

Seawater, equations of motion, interaction between air and sea, currents, wind-waves in deep and shallow waters, long ocean waves, tides, wave-statistics, sea ice. Prerequisite: ME 221 or equivalent. (Spring)

231 **Solid State for Engineers** (3)

Crystal structure and binding, elastic constants, lattice vibrations, thermal properties, free electron theory of metals, band theory of solids, semiconductors, rectifiers and transistors, superconductivity. Prerequisite: approval of Department. (Fall)

232 **Advanced Materials Science** (3)

Simple crystal structures; the defect crystal structure—point defects, line defects, surface defects; grain-boundaries; X-ray and electron diffraction; diffusion in solids, metallic solutions, and compounds; ceramics; polymeric materials; elastic properties; internal friction; geometry, statics, and dynamics of dislocations; microplasticity, plasticity, work-hardening, and fatigue; creep; strengthening mechanisms; radiation damage; cohesive strength. Prerequisite: approval of Department. (Spring)

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

233 Superconductivity and Electron Transport (3)

Elements of quantum and statistical mechanics. Electromagnetic concepts, second quantization-creation and destruction operators, superconductor and perfect conductor, thermodynamic theories. The intermediate state (Type I superconductors), transport phenomena, the mixed state (Type II superconductors). Statistical and quantum superconductivity, the fluxoid, quantum interference. Physical and mathematical introduction to the microscopic theory of superconductivity. Persistent currents. Properties of metallic superconductors, thin films; metallurgical aspects, interpolation and sandwiching. Organic superconductivity. Prerequisite: ES 231. (Spring)

234 Composite Materials (3)

Principles of composites and composite reinforcement; micromechanics and failure; interface reactions in various composites; reinforcing materials; structure of composites—fiber-reinforced polymers, filler-reinforced polymers, fiber-reinforced metals, directionally solidified alloys, dispersion-strengthened metals. Prerequisite: approval of Department. (Spring)

235 Physical Metallurgy (3)

Relations among structures, properties, and reactions of metals and alloys; structures and equilibria, kinematics of physical and chemical reactions; plastic deformation mechanisms, diffusion, solid reactions; phase diagrams and phase transformations, recrystallization and grain growth; dislocations—their formation and multiplication in crystal structures; elementary strengthening mechanisms. Prerequisite: approval of Department. (Fall)

236 Wave Propagation in Solids (3)

Small amplitude plane and spherical wave propagation in unbounded elastic media; dilational, shear, and surface waves; reflection and refraction of plane waves; free waves in finite bodies. Prerequisite: ES 221 or approval of Department.

***237 Quantum Mechanical Treatment of Metals** (3)

Elements of quantum mechanics, including Schroedinger equation and elementary perturbation theory. Applications to basic processes in the theory of solids: lattice waves, electron states, electron-electron and electron-phonon interactions. Boltzmann equation and transport properties; Fermi surfaces; theory of superconductivity. Prerequisite: ES 231 or approval of Department. (Spring)

***239 Physical Ceramics** (3)

Crystal chemistry and the systematic study of the structure of ceramic materials; solid reactions occurring at elevated temperatures; sintering, vitrification, diffusional mechanisms and effects; reaction rate theory; elastic, anelastic, and plastic properties of ionic and covalent solids; viscoelastic behavior of vitreous and vitreous-solid systems; phase equilibria of ceramic systems. Prerequisite: approval of Department. (Spring)

240 Fracture Mechanics (3)

Fundamentals of brittle fracture, Griffith theory and extensions, mechanics of fracture, linear elastic systems, plasticity considerations, fracture toughness, engineering analysis, notch strength analysis with limit approach

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crack propagation laws, fatigue, fracture testing, comparison of recent continuum theories. Prerequisite: approval of Department. (Spring)

241 **Fatigue** (3)

Study of fatigue in materials, including metals, high-strength alloys, and composite materials. Strain hardening and softening, crack initiation and propagation metallographic effects, fatigue fracture and statistical aspects. Prerequisite: approval of Department. (Fall)

256 **Introduction to the Theories of Inelastic Media** (3)

Physical basis of anelasticity, viscoelasticity, plasticity, and viscoplasticity; constitutive equations of elastic and viscoelastic media; foundations of the theories of plasticity and viscoplasticity; one- and two-dimensional boundary-value problems in linear-visco-elastic and elastic-plastic media; the rigid-plastic medium; simple problems in nonlinear viscous and visco-plastic media; wave propagation in inelastic media. Prerequisite: approval of Department. (Spring)

259 **Nonlinear Mechanics of Continua** (3)

Development of fundamental concepts of nonlinear media and their applications. Prerequisite: Ap S 212 and ES 221, or ES 256. (Fall)

*263 **Atmospheric Physics for Engineers** (3)

Introduction to physical processes in the earth's atmosphere; comparisons to the atmospheres of other planets. Topics: evolution, structure, dynamics, visible phenomena, the ionosphere, and radiation processes. Prerequisite: approval of Department. (As arranged)

*270 **Introduction to Acoustics** (3)

Waves in an infinite homogeneous medium; sound transmission in layer media and through structure, source, and dipole fields; sound propagation in ducts and enclosures; sound propagation through atmosphere and acoustic absorptions, acoustic circuit elements; acoustic transducers; introduction to acoustic measurements. Prerequisite: approval of Department. (As arranged)

*271 **Random Process Theory I** (3)

Probability theory and distributions; random variables and types of random processes; relations between correlation functions, power spectra, and indicial response; measurement and use of power spectra; behavior of physical systems under random inputs. Prerequisite: approval of Department. (As arranged)

*272 **Random Process Theory II** (3)

Discrete and continuous state Markov-processes; chains, queues, diffusion, and passage problems; linear and nonlinear estimation and stochastic control; estimation of correlations and power spectra; applications in communication theory; scattering from random surfaces; stochastic linearization and stability. Prerequisite: ES 271. (As arranged)

*273 **Time Series Analysis** (3)

General properties of stationary and nonstationary random processes. Correlation techniques, types of harmonic analysis, analog and digital spectral

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estimation, variability of estimates, prediction and filtering of time series. Applications in communications, vibration, and fluid dynamics. Prerequisite: approval of Department. (As arranged)

*274 **Noise and Vibration Control** (3)

Introduction to the physical effects of noise and vibration on man, practical sources of noise and their control; building noise, ventilation system noise, mechanical equipment noise, aircraft noise; automobile and truck noise; factors affecting vibration levels and vibration control by structural design, damping, and isolation. Prerequisite: ES 270, ME 215. (As arranged)

*275 **Advanced Theoretical Acoustics** (3)

Acoustic wave motion, several methods of solving inhomogeneous wave equation, theory of sources, scattering and diffraction, duct propagation, introduction to acoustically coupled systems, acoustics in moving media. Prerequisite: Ap S 213, ES 270. (As arranged)

*276 **Acoustical and Mechanical Measurements** (3)

Characteristics of signals, basic transducer elements, standards of measurements and calibrations, signal recording and processing, acoustical and vibration instrumentation, vibration exciters, vibration testing techniques, flow mechanical measurements. Prerequisite: ES 270, ME 215. (As arranged)

*277 **Physical Acoustics** (3)

Concepts of continuum mechanics and thermodynamics, wave propagation in real media, thermal viscous and relaxational attenuations, piezoelectric crystals and ultrasonics, wave propagation in rigid and deformable porous media. Prerequisite: ES 275. (As arranged)

*278 **Psychological and Physiological Acoustics** (3)

Auditory system and its response to sound, experimental methodology in psychoacoustics, subjective response to sound, environmental noise and its evaluation, criteria for the prediction of noise nuisance, nonauditory system response to noise. Prerequisite: approval of Department. (As arranged.

*279 **Human Factors in Engineering** (3)

Man-machine interface, effects of physical stresses on human behavior and performance, life support system, learning and conditioning of physical stresses. (Spring)

*280 **Special Topics in Acoustics** (3)

Current methods and problems in acoustics. Topics chosen from such areas as aerospace noise generation and control; instruments and procedures for acoustics measurements; and responses of structures, people, and communities to noise. Prerequisite: approval of Department. (As arranged)

282 **Computer-aided Design** (3)

Fundamental concepts in the development of computational algorithms for the design of structures, machine component and assemblies, and other engineering systems. Representation of the design process and de-

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sign specifications as a network of decision tables and logical flags. Optimization techniques and algorithms in design applications. Interactive computer-aided design methods based on the use of remote access computer terminals. General purpose computer programs for engineering analysis and design. Students, individually or in groups, are required to develop a small-scale general-purpose design program in an appropriate area such as structural design, machine design, urban planning, environmental quality control, etc. Prerequisite: approval of Department. (Spring)

283 **Application of Computer Graphics in Engineering** (3)

Curve-fitting techniques as applied to computer graphics; construction of a library of geometric lines and curves connecting a series of discrete points. Representation of two- and three-dimensional geometrical shapes by a set of discrete points. Automatic generation and display on CRT screen of geometrical shapes consisting of a grid of discrete points interconnected by user-selected geometric shapes. Automatic mesh generation, transformations, projections, and the concept of "hidden" lines. Use of remote computer terminals and graphic plotter equipment in interactive computer-graphics applications. Prerequisite or concurrent registration: ES 284. (Fall)

284 **Numerical Methods in Engineering** (3)

Review of programming fundamentals; matrix operations and solution of simultaneous equations; difference methods and computer solution of ordinary and partial differential equations; numerical solution of initial and boundary-value problems in heat transfer, fluid flow, and structural mechanics. Prerequisite: approval of Department. (Fall)

285 **Finite Element Methods in Engineering Mechanics** (3)

Derivation of fundamental equations based on energy formulation; stiffness properties of basic finite elements; solution of problems in plane stress and strain, plane- and space-framed structures; plate and shell structures; elastoplastic and dynamic analysis. Prerequisite: approval of Department. (Spring)

*286 **Analysis and Design of Thin-walled Structures** (3)

Statistics of thin-walled beams and panels, force interplay between stiffeners and skin in the analysis and design of stiffened thin-walled structures; strength and stiffness of locally buckled stiffened structures; classification of loads and safety factors; different considerations governing the design of thin-walled structures; critical evaluation of various structural design procedures. Prerequisite: CE 261, 263; ES 285. (As arranged)

*287 **Automated Design of Complex Structures** (3)

Review of techniques for automated design including mathematical programming, fully stressed design, and optimality criteria; application of automated design techniques to stiffened and composite shell-type structures; multiple-load conditions and design constraints. Prerequisite: approval of Department. (As arranged)

289 **Special Topics in Structural Design** (3)

Prerequisite: approval of Department. (As arranged)

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

298 **Research** (arr.)
Basic research projects as arranged. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)
(Fall and spring)

*310 **Aeroacoustics** (3)
General theory of aerodynamic sound generation and propagation, Lighthill's formulation of jet noise, similarity laws, supersonic and subsonic jet noise, boundary layer noise, fan and compressor noise, helicopter noise, sonic booms. Current problems in aeroacoustics. Prerequisite: ES 275. (As arranged)

*311 **Nonlinear Acoustics** (3)
Finite amplitude waves and waves in moving stratified media. Interaction between linear and nonlinear waves, wave propagation through nonlinear media, applications to transmission of sound through ducts with flow and absorbing walls. Prerequisite: approval of Department. (As arranged)

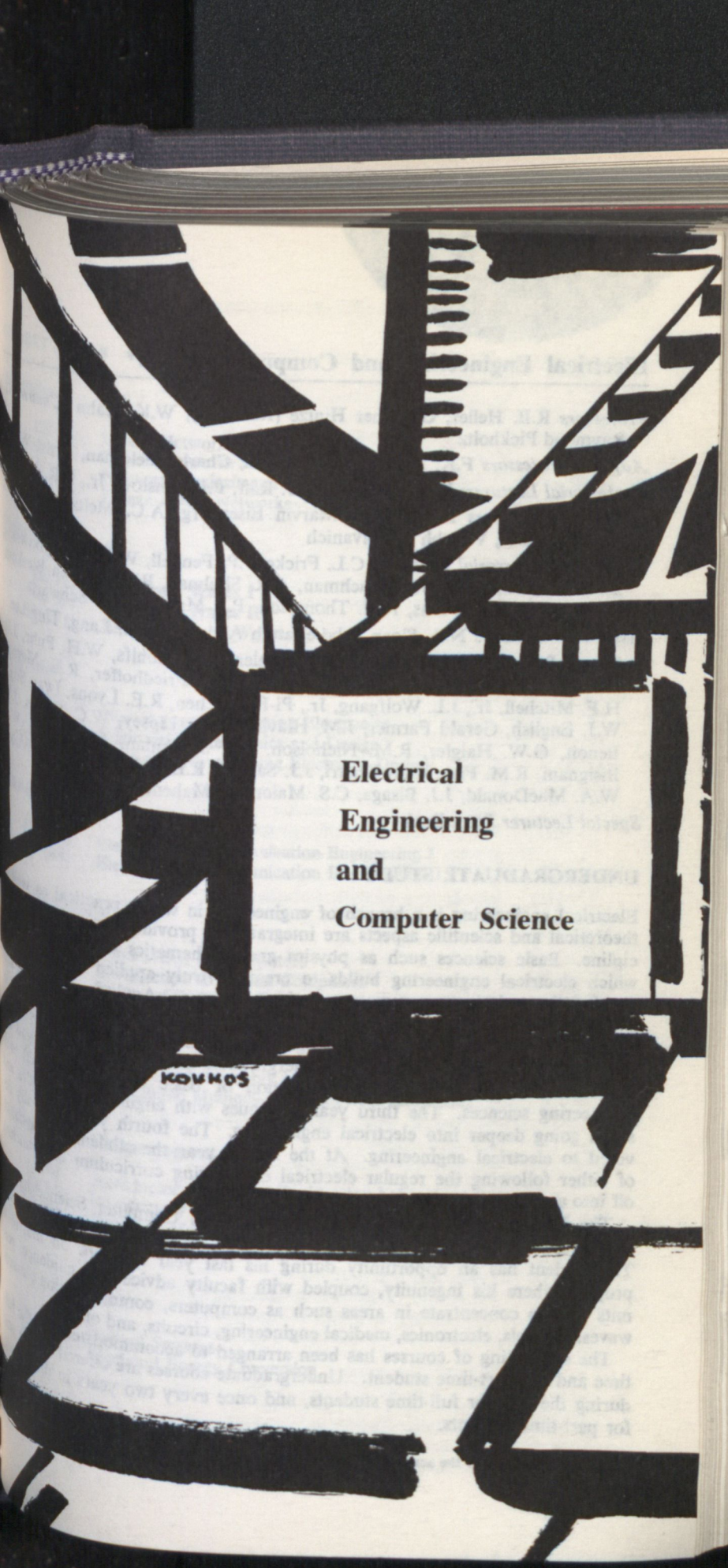
*312 **Theory of Random Vibration** (3)
Response of linear systems to stationary random inputs. Failures resulting from dynamic response. Response of space vehicle structures to intense noise fields, measurement, and application. Prerequisite: ES 271, ME 215. (As arranged)

*313 **Structural Acoustic Interaction** (3)
Coupled response of structures to sound, system of infinite extent, system of finite extent, sound radiation from structure, sound transmission through structure. Panel response to turbulent boundary-layer excitation. Sound radiation from mechanically excited structure vibration. Prerequisite: ES 270, 312. (As arranged)

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.


Electrical
Engineering
and
Computer Science
KOUKOS

Electrical Engineering and Computer Science*

Professors R.B. Heller, Guenther Hintze *(Research)*, W.K. Kahn *(Chairman)*, Raymond Pickholtz

Adjunct Professors F.K. Harris, C.A. Caceres, Charles Feldman, Ernst Weber

Professorial Lecturers W.F. Crosswell, S.J. Raff, P.H. Enslow, Jr., P.R. Geffe

Associate Professors E.H. Braun, Marvin Eisenberg, A.C. Meltzer, Nicholas Kyriakopoulos, Vallobh Vimolvanich

Associate Professorial Lecturers C.L. Fricke, J.P. Fennell, Wasyl Wasylkiwskyj, B.M. Horowitz, Leonard Schuchman, A.R. Shulman, Richard Van Blerkom, W.H. Carter, Allen Das, R.H. Thompson, P.J. Martin, J.W. Schwartz

Assistant Professors N.A. Sloan, Abd-elfattah Abd-alla, R.H. Lang, Ting Lee

Assistant Professorial Lecturers D.O. Baechler, D.C. Rohlfs, W.H. Fuhr, J.H. O'Hara, J.J. Rocchio, Jr., George Saxton, J.A. Friedhoffer, R.E. Merwin, H.F. Mitchell, Jr., J.L. Wolfgang, Jr., Pi-Fuay Chen, R.E. Lyons, Iwao Sugai, W.J. English, Gerald Farmer, J.M. Hlavin, Elmer Lipsey, W.C. Scales, J.W. Benoit, G.W. Haigler, R.M. Nicholson, J.R. Silverman, J.I. Auñón, W.T. Bisignani, R.M. Fish, Ram Khatri, J.J. Salasin, R.E. Schneider, J.W. Woods, W.A. MacDonald, J.J. Bisaga, C.S. Maiorana, Mahendra Shah

Special Lecturer Peter Bock

UNDERGRADUATE STUDY

Electrical engineering is a branch of engineering in which practical as well as theoretical and scientific aspects are integrated to provide a well-balanced discipline. Basic sciences such as physics and mathematics form the roots on which electrical engineering builds to create a truly applied science and to develop the techniques necessary to solve problems. Analysis, synthesis, and design go hand in hand. The electrical engineering curriculum is designed to provide the student with such an integrated approach. The first two years of the curriculum are common to all undergraduate fields in the School and are devoted to developing a sound foundation of basic sciences coupled with engineering sciences. The third year continues with engineering sciences and starts going deeper into electrical engineering. The fourth year is totally devoted to electrical engineering. At the fourth year the student has a choice of either following the regular electrical engineering curriculum or branching off into an area of concentration in computer science.

The Department of Electrical Engineering and Computer Science has recently acquired modern laboratory equipment, including its own computer. The student has an opportunity during his last year to work on individual projects where his ingenuity, coupled with faculty advice and guidance, permits him to concentrate in areas such as computers, communications, microwaves, controls, electronics, medical engineering, circuits, and others.

The scheduling of courses has been arranged to accommodate both the full-time and the part-time student. Undergraduate courses are offered once a year during the day for full-time students, and once every two years in the evening for part-time students.

* Staff of instruction for the academic year 1972–73.

SUBJECT AREAS

Networks

EE 11: Linear Networks I
EE 12: Linear Networks II
EE 113: Network Analysis and Design
EE 114: Linear Active Networks

Fields and Waves

EE 31: Fields and Waves I
EE 32: Fields and Waves II
EE 133: Electromagnetic Waves

Electronics

EE 20: Introductory Engineering Electronics
EE 121: Engineering Electronics and Design
EE 122: Pulse and Waveshaping Electronic Design

Communications

EE 143: Elements of Communication Engineering I
EE 144: Elements of Communication Engineering II

Computer Science

EE 51: Applications of Computers
EE 152: Introduction to Digital Computers
EE 153: Design of Switching Systems
EE 154: Digital Computer Design
EE 155: Introduction to Numerical Methods for Computers
EE 156: Introduction to System Programming
EE 157: Machine and Assembly Language Programming
EE 158: Algorithmic Methods and High-level Languages

Laboratories and Measurement

EE 60: Introductory Electrical Engineering Laboratory I
EE 61: Introductory Electrical Engineering Laboratory II
EE 160: Electrical Measurements
EE 161–62: Electrical Engineering Laboratory

Controls and Systems

EE 172: Control Systems
EE 177: Electrical Energy Conversion

Medical Engineering

EE 184: Introduction to Medical Engineering

CURRICULUM IN ELECTRICAL ENGINEERING

First Semester

Ap S 1: Engineering in Modern Society (1)
Engl 1 or 1x: English Composition: Language as Communication (3)
Math 30: Precalculus (3)
Phys 1: General Physics (4)
Elective: Selected from humanities or social sciences (3)

Second Semester

Ap S 2: Engineering in Modern Society (1)
EE 51: Applications of Computers (3)
Math 31: Calculus of One Variable (3)
Phys 2: Introduction to Modern Physics (4)
Elective: Selected from humanities or social sciences (3)

Third Semester

Ap S 115: Probabilistic and Statistical Methods in Engineering (3)
Chem 13: General Chemistry (4)
Math 32: Calculus of Several Variables (3)
Phys 31: Introduction to Theoretical Physics (2)
Phys 51: Introduction to Experimental Physics (2)
Elective: Selected from humanities or social sciences (3)

Fourth Semester

Ap S 59: Introductory Analytical Mechanics (4)
Ap S 113: Engineering Analysis I (3)
CE 140: Materials Science (3)
Phys 32: Introduction to Theoretical Physics (2)
Phys 52: Introduction to Experimental Physics (2)
Elective: Selected from humanities or social sciences (3)

Fifth Semester

Ap S 114: Engineering Analysis II (3)
EE 11: Linear Networks I (3)
EE 31: Fields and Waves I (3)
EE 60: Introductory Electrical Engineering Laboratory I (2)
ME 131: Thermodynamics (3)
Elective: Selected from humanities or social sciences (3)

Sixth Semester

EE 12: Linear Networks II (3)
EE 20: Introductory Engineering Electronics (3)
EE 32: Fields and Waves II (3)
EE 61: Introductory Electrical Engineering Laboratory II (2)
EE 152: Introduction to Digital Computers (3)
Elective: Selected from humanities or social sciences (3)

Seventh Semester

EE 113: Network Analysis and Design (3)
EE 121: Engineering Electronics and Design (3)
EE 133: Electromagnetic Waves (3)
EE 143: Elements of Communication Engineering I (3)

EE 161: Electrical Engineering Laboratory (2)
EE 177: Electrical Energy Conversion (3)
or EE 184: Introduction to Medical Engineering (3)

Eighth Semester

EE 114: Linear Active Networks (3)
EE 122: Pulse and Waveshaping Electronic Design (3)
EE 144: Elements of Communication Engineering II (3)
EE 160: Electrical Measurements (3)
EE 162: Electrical Engineering Laboratory (2)
EE 172: Control Systems (3)

Computer Science Option

Computer science is a new and developing discipline which combines the electronic design and mathematical utilization of computers into a single comprehensive area. The student who completes this option will be able to design both the hardware and software needed for large-scale computing systems. The curriculum prepares the student for graduate school or for a career in computer design and applications.

First Semester

ApS 1: Engineering in Modern Society (1)
Engl 1 or 1x: English Composition: Language as Communication (3)
Math 30: Precalculus (3)
Phys 1: General Physics (4)
Elective: Selected from humanities or social sciences (3)

Second Semester

ApS 2: Engineering in Modern Society (1)
EE 51: Applications of Computers (3)
Math 31: Calculus of One Variable (3)
Phys 2: Introduction to Modern Physics (4)
Elective: Selected from humanities or social sciences (3)

Third Semester

ApS 115: Probabilistic and Statistical Methods in Engineering (3)
Chem 13: General Chemistry (4)
Math 32: Calculus of Several Variables (3)
Phys 31: Introduction to Theoretical Physics (2)
Phys 51: Introduction to Experimental Physics (2)
Elective: Selected from humanities or social sciences (3)

Fourth Semester

ApS 59: Introductory Analytical Mechanics (4)
ApS 113: Engineering Analysis I (3)
CE 140: Materials Science (3)
Phys 32: Introduction to Theoretical Physics (2)
Phys 52: Introduction to Experimental Physics (2)
Elective: Selected from humanities or social sciences (3)

Fifth Semester

ApS 114: Engineering Analysis II (3)

EE 11: Linear Networks I (3)
EE 31: Fields and Waves I (3)
EE 60: Introductory Electrical Engineering Laboratory I (2)
ME 131: Thermodynamics (3)
Elective: Selected from humanities or social sciences (3)

Sixth Semester

EE 12: Linear Networks II (3)
EE 20: Introductory Engineering Electronics (3)
EE 32: Fields and Waves II (3)
EE 61: Introductory Electrical Engineering Laboratory II (2)
EE 152: Introduction to Digital Computers (3)
Elective: Selected from humanities or social sciences (3)

Seventh Semester

EE 113: Network Analysis and Design (3)
EE 121: Engineering Electronics and Design (3)
EE 153: Design of Switching Systems (3)
EE 155: Introduction to Numerical Methods for Computers (3)
EE 157: Machine and Assembly Language Programming (3)
EE 161: Electrical Engineering Laboratory (2)

Eighth Semester

EE 122: Pulse and Waveshaping Electronic Design (3)
EE 154: Digital Computer Design (3)
EE 156: Introduction to System Programming (3)
EE 158: Algorithmic Methods and High-level Languages (3)
EE 162: Electrical Engineering Laboratory (2)
EE 172: Control Systems (3)

COURSES

11 Linear Networks I (3)

Circuit concepts, elements, and parameters; network conventions and equations: mesh and node analysis; network solutions using differential equations and initial conditions; transient and steady-state response; impedance concepts; energy and power; resonance. Prerequisite: Ap S 113, Phys 32. (Fall—day and evening)

12 Linear Networks II (3)

Singular functions; Laplace transform; network functions, poles and zeros; total response; time and frequency domains; convolution theorems; Fourier analysis, spectra; frequency response, Bode plots; two-port parameters. Prerequisite: Ap S 114, EE 11. (Offered every spring—day; spring 1975 and alternate springs—evening)

20 Introductory Engineering Electronics (3)

Various types of devices used in electronic engineering considered from the point of view of the physics of their operation and from the engineering point of view of their application to electronic circuits. Solid-state, vacuum, and gaseous devices. Primary emphasis on application of these elements in power supplies and in linear amplifiers. Introduction of design concepts through use of graphical techniques. Prerequisite: EE 11. (Spring—day and evening)

31 **Fields and Waves I** (3)

Vector calculus, orthogonal coordinates, Coulomb's and Gauss' laws, scalar potential, dipoles, method of images, Laplace's and Poisson's equations, boundary-value problems. Prerequisite: Phys 32. Prerequisite or concurrent registration: Ap S 114. (Offered every fall—day; fall 1974 and alternate falls—evening)

32 **Fields and Waves II** (3)

Biot-Savart law, Ampere's law, vector potential, magnets, polarization and polarization currents, Faraday's law, Maxwell's equations, plane waves, and Poynting vector. Prerequisite: EE 31. (Offered every spring—day; spring 1975 and alternate springs—evening)

51 **Applications of Computers** (3)

Solution of problems on digital computers, using FORTRAN, data processing, and numerical methods. Writing, debugging, and running programs on a digital computer. (Fall—evening; spring—day and evening)

60 **Introductory Electrical Engineering Laboratory I** (2)

Use, theory of design, and application of standard electronic laboratory equipment; applications of instrumentation through experiments in basic network theorems; measurement of electrical quantities and characteristics of electrical devices. Prerequisite or concurrent registration: EE 11, 31. (Fall—day and evening)

61 **Introductory Electrical Engineering Laboratory II** (2)

Characteristics of electronic devices and circuits; design of electronic amplifiers and measurement of their properties; experiments in support of courses in networks, fields, and electronics. Prerequisite or concurrent registration: EE 12, 20, 60. (Offered every spring—day; spring 1975 and alternate springs—evening)

113 **Network Analysis and Design** (3)

Application of matrices and linear graphs to electrical networks; trees, circuits, cut-sets; network equations; signal-flow graphs; introduction to state-space techniques; computer solutions; network transfer functions; properties and synthesis of two-element, one-port networks; filter theory and design; computer-aided circuit design. Prerequisite: EE 12, 20. (Offered every fall—day; fall 1974 and alternate falls—evening)

114 **Linear Active Networks** (3)

Description of networks by terminal and port concepts; power and scattering parameters; analysis of active networks, including negative impedance converters, gyrators, etc.; interconnection of networks; properties of active networks, including reciprocity, stability, activity, and feedback. Prerequisite: EE 113. May be taken for graduate credit. (Offered every spring—day; spring 1975 and alternate springs—evening)

121 **Engineering Electronics and Design** (3)

Graphical analysis and design beyond the level covered in EE 20. Introduction of incremental analysis and design methods to electronic circuits; use of equivalent circuits; amplifiers, oscillators, modulation and demodulation. Prerequisite: EE 20. (Offered every fall—day; fall 1974 and alternate falls—evening)

122 Pulse and Waveshaping Electronic Design (3)
Introduction to and design of nonlinear circuits used in modern-day computer and communications systems. Pulse, sweep, switching, and logic circuits; counting and timing circuits. Prerequisite: EE 121. (Offered every spring—day; spring 1975 and alternate springs—evening)

133 Electromagnetic Waves (3)
Time-harmonic Maxwell equations, complex Poynting vector, transmission lines, characteristics of common waveguides, resonant cavities, Smith chart, Lorentz reciprocity, simple antennas, linear antenna arrays. Prerequisite: EE 32. (Fall—day)

143 Elements of Communication Engineering I (3)
Fourier series and transforms; power spectra and correlation; principles of modulation; amplitude, angle, and pulse modulation; modulation and demodulation systems; time and frequency division multiplexing. Prerequisite or concurrent registration: EE 113, 121. (Offered every fall—day; fall 1973 and alternate falls—evening)

144 Elements of Communication Engineering II (3)
Introduction to the statistical theory of communication, random signals and noise, concepts of information theory, transmission of information over noisy channels, comparison of modulation systems in the presence of noise. Prerequisite: EE 143. (Offered every spring—day; spring 1974 and alternate springs—evening)

152 Introduction to Digital Computers (3)
Introduction to the use and structure of digital computers, addressing methods, data processing, and machine language programming; Boolean algebra and introduction to the design of combinational switching circuits; number systems and arithmetic in digital machines; machine subsystems and their interconnections; use of software systems and software-hardware relationships. Prerequisite: EE 51 or permission of instructor. (Offered every spring—day; spring 1975 and alternate springs—evening)

153 Design of Switching Systems (3)
Switching algebra and Boolean logic; analysis and design of switching devices; design of combinational and sequential logic networks; minimization techniques and their use in logic design; electronic implementation of logic; number systems and codes, geometric interpretation, error-correcting codes; encoding and decoding; logic and electronic design of functional digital units. Prerequisite: EE 152 or permission of instructor. May be taken for graduate credit. (Fall—day and evening)

154 Digital Computer Design (3)
Logic and electronic design of functional digital units, design of computer subsystems, flow of information and logical flow diagrams in timing and control; design of memory, arithmetic, and I/O units; binary and decimal machine arithmetic; design of a digital computer. Prerequisite or concurrent registration: EE 153 or permission of instructor. May be taken for graduate credit. (Spring—day and evening)

155 Introduction to Numerical Methods for Computers (3)
Use of numerical methods in engineering and scientific problems, concepts of algorithm and flowcharts, errors in computer and numerical methods.

Introduction to numerical methods for the solution of simultaneous linear algebraic equations, roots of equations, numerical differentiation, and integration; the solution of ordinary differential equations. Statistical methods for the evaluation of experimental data and correlation techniques. Prerequisite: EE 51 or equivalent. (Offered every fall—day; fall 1974 and alternate falls—evening)

156 **Introduction to System Programming** (3)

Introduction to computer software and software systems; management of computer software; concepts in the use of macro-assemblers, loaders, monitors, and executive systems; control of input-output and utility programs; recursive and reentrant programming for time-shared systems; introduction to multiprogramming and multiprocessor software systems. Prerequisite: EE 157 or permission of instructor. May be taken for graduate credit. (Offered every spring—day; spring 1975 and alternate springs—evening)

157 **Machine and Assembly Language Programming** (3)

Machine and assembly language programming in fixed and variable word-length computers; techniques in addressing and machine control; data structures; use of subroutine linkages; co-routines, pushdown lists, list processing, loops and input-output subroutines; use of a macro-assembly language; sorting, merging, arrays, and data fields in data processing. Prerequisite: EE 152 or equivalent, or permission of instructor. May be taken for graduate credit. (Fall—day and evening)

158 **Algorithmic Methods and High-level Languages** (3)

Introduction to high-level procedural and problem-oriented computer languages; data structures and choice of a data processing language. List processing, string processing, and introduction to information retrieval; introduction to the structure of high-level languages; deterministic and probabilistic simulation and simulation languages; introduction to heuristic programming. Prerequisite: EE 51 or equivalent and permission of instructor. May be taken for graduate credit. (Spring—day and evening)

160 **Electrical Measurements** (3)

Electrical measurements, from direct current through radio frequencies; techniques; detectors; bridges; measurement of current, voltage, power, resistance, capacitance, inductance, energy, phase angle, frequency, and time; dielectric and magnetic measurements; topics in high-frequency measurement, including field strength, signal-to-noise ratio, impedance, attentuation. Prerequisite: EE 12, 20. (Spring—evening)

161–62 **Electrical Engineering Laboratory** (2–2)

Experiments in support of courses in networks, electronics, microwaves, computers, communications, controls, and machines. The student is required to begin a design project in the first half of the course; the completion of this project is the major effort of the second half. Prerequisite or concurrent registration: EE 61, 113, 121, 152. EE 161 is prerequisite to EE 162. (Academic year—day and evening)

172 **Control Systems** (3)

Mathematical models of linear systems; steady-state and transient analyses; root locus and frequency response methods; synthesis of linear feedback control systems. Prerequisite: Ap S 114, EE 11. (Offered every spring —day; spring 1975 and alternate springs—evening)

177 **Electrical Energy Conversion** (3)
Fundamentals of electromechanical energy conversion. Electromechanical transducers and their equivalent circuits, three-phase and single-phase a-c rotating machines, d-c machines, rotating machines as circuit elements. Prerequisite: EE 12. (Offered every fall—day; fall 1973 and alternate falls—evening)

184 **Introduction to Medical Engineering** (3)
Designed to introduce the engineering or physical sciences student to the applications of engineering in the medical sciences; terminology of the medical profession emphasized; the physiology of the human body presented from over-all systems or functional approach; survey of present-day medical measurements and consideration of those areas in which engineering may be applied advantageously to medicine. May be taken for graduate credit. Admission by permission of instructor. (Fall—day and evening)

198 **Research** (1 to 3)
Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. (Fall and spring)

GRADUATE STUDY

Electrical engineering, at the graduate level, provides one of the most stimulating experiences in advanced studies. The student has reached a degree of maturity and basic knowledge that allows him to enter into new avenues of exciting work. Courses prepare the student in areas of concentration such as systems science, networks, and controls; electrophysics (electronics, fields and waves); communications; medical engineering; and computer science (hardware and software). Depending upon the interest of the student, some of the programs leading to the degree of Master of Science are given at the NASA-Langley Research Center, Langley Station, Hampton, Virginia. NASA-Langley's extensive scientific and engineering facilities and equipment are utilized whenever feasible. Arrangements can also be made to use the facilities of the Naval Ship Research and Development Center, Annapolis, Maryland, where an off-campus Master's degree pilot program has been initiated.

The graduate programs are formulated to take into consideration the student's individual strengths, potentials, skills, aspirations, and abilities. Determined through consultation by the student and his faculty adviser, their purpose is to provide the student with a thorough understanding of his area of concentration and at the same time to provide him with the breadth of knowledge necessary in modern engineering.

The graduate programs are, in addition, designed to provide a needed educational service to the Washington technical community. Many of the courses have been developed after consultation with private industry and government agencies of the area. They are offered during both the afternoon and evening with a principle of rotation from year to year.

The Department of Electrical Engineering and Computer Science has continuously kept the graduate program up to date, through constant contact with recent developments, through its own research, and through the addition of several experts in appropriate fields serving as part-time and adjunct faculty. The Department provides a well-balanced, modern graduate program.

In order to provide the student with detailed information about its graduate programs, from the point of view of procedures, requirements, regulations, and scope, the Department of Electrical Engineering and Computer Science publishes annually a detailed brochure to supplement the present catalogue. In addition, the Department publishes special pamphlets describing specific programs.

AREAS OF CONCENTRATION

Systems Science, Networks, and Controls

EE 201: Natural Modes and Transients in Electrical Systems
EE 202: Linear System Theory I
EE 203: Linear System Theory II
EE 204: Stochastic Signals and Noise
EE 205: Stochastic Processes in Electrical Engineering
EE 212: Advanced Network Analysis
EE 215: Linear Network Synthesis I
EE 216: Linear Network Synthesis II
EE 272: Discrete Systems
EE 273: System Optimization
EE 274: Nonlinear Systems
EE 275: System Identification and Adaptive Systems
EE 276: Cybernetics
EE 278: Spacecraft Systems Design
EE 319: Networks Research
EE 371: Simulation Methods for System Analysis
EE 372: Analysis and Control of Large Systems
EE 379: Controls and Systems Research

Electrophysics (Electronics, Fields and Waves)

EE 201: Natural Modes and Transients in Electrical Systems
EE 221: Physical Electronics I
EE 222: Physical Electronics II
EE 224: Quantum Electronics of Masers and Lasers
EE 225: Nonlinear Electronics
EE 226: Optical Electronics
EE 227: Industrial Electronics
EE 228: High-frequency Electronics
EE 229: Precise Optical Measurements
EE 230: Electromagnetic Theory
EE 231: Field Analysis and Potential Theory
EE 232: Electrodynamics
EE 233: Microwaves and Components
EE 234: Electromagnetic Wave Propagation
EE 235: Antennas
EE 236: Plasma Dynamics
EE 238: Precise Microwave Measurements
EE 239: Precise Electrical Standards
EE 255: Optical Processing
EE 256: Environmental Optics
EE 323: Principles of Microelectronics
EE 329: Electronics Research
EE 339: Fields and Waves Research

Communications

EE 204: Stochastic Signals and Noise
EE 205: Stochastic Processes in Electrical Engineering
EE 241: Information Theory
EE 242: Coding Theory
EE 243: Communication Theory I
EE 244: Communication Theory II
EE 245: Signal Detection and Estimation Theory
EE 246: Digital Communications
EE 247: Communication Systems
EE 248: Microwave Communication Systems
EE 249: Data Telecommunication Networks
EE 277: Space Communication Systems
EE 349: Communications Research

Medical Engineering

EE 256: Environmental Optics
EE 281: Medical Instrumentation I
EE 282: Medical Instrumentation II
EE 283: Introduction to Medicine for Engineers I: Physiology and Anatomy
EE 284: Introduction to Medicine for Engineers II: Clinical Medicine
EE 285: Engineering in Physical Medicine and Rehabilitation
EE 286: Sensory Evoked Potentials
EE 287: Computer-aided Analysis of Physiological Signals
EE 288: Physiological Controls and Systems
EE 389: Medical Engineering Research

Computer Science (Hardware and Software)*

CS 201: Introduction to Computer Systems I
CS 202: Introduction to Computer Systems II
CS 215: Computer Graphics and Pattern Recognition
CS 216: Information Retrieval Systems
CS 231: Finite State Machines
CS 232: Finite Automata
CS 237: Computing Systems
CS 238: Advanced Computing Systems
CS 240: Theory and Practice of Microprogramming
CS 263: Digital Computer Programming Systems
CS 264: Design of Compilers and High-level Languages
CS 265: Systems Programming
CS 278: Analog and Hybrid Computers
CS 284: Applications of Numerical Methods
†CS 285: Approximation of Functions and Data Representations
CS 391: Computer Science Research

ELECTRICAL ENGINEERING COURSES

201 **Natural Modes and Transients in Electrical Systems** (3)

Transient response and natural modes of electrical systems; techniques for analyzing systems with periodic and aperiodic inputs and outputs; sampling. (Fall and spring)

* See also preparatory undergraduate courses in Electrical Engineering and Computer Science, pages 96–100.

† Offered at NASA-Langley Research Center; may be offered on campus when arranged.

202 **Linear System Theory I** (3)
Graph theory and its application to networks and systems; system description in time and frequency domain; linear spaces and linear operators; mathematical representation of linear systems; analytical and computer solutions of the state equations; transient and steady-state response. Prerequisite: graduate status. (Fall 1973 and alternate falls—evening; fall 1974 and alternate falls—day)

203 **Linear System Theory II** (3)
System properties; controlability and observability of linear systems; sensitivity and stability analyses. Irreducible realizations of rational transfer-function matrices; canonical forms, state feedback, and state estimators. Linear composite systems. Prerequisite: EE 202. (Spring 1974 and alternate springs—evening; fall 1974 and alternate falls—day)

204 **Stochastic Signals and Noise** (3)
Probability, random variables, characteristic functions; transformations of random variables and applications; sequences of random variables, linear mean-squared estimation; stationary estimation, stationary random processes, correlation functions, power spectrum; output of linear systems with stochastic inputs; Gaussian processes. Applications drawn for communications, control theory, computer science. (As arranged)

205 **Stochastic Processes in Electrical Engineering** (3)
Markov chains, state classification, Kolmogorov equation; applications to probabilistic finite-state machines. Birth-death process, applications to queing theory, buffer problems, and the design of communication nets. Continuous state processes, diffusion processes, passage times, and estimation problems. Estimation and power spectra. Stochastic difference and differential equations. Applications to communication theory, control theory, computer science, and propagation theory of random media. Prerequisite: EE 204 or equivalent. (As arranged)

212 **Advanced Network Analysis** (3)
Network theorems, network functions, relationship of parts of network functions; network properties, realizability and causality concepts; computer-aided network analysis. Prerequisite: EE 202 or equivalent. (Spring—evening)

215 **Linear Network Synthesis I** (3)
Properties and testing of positive real functions. Synthesis of LC, RL, RC one-port networks. Brune, Bott-Duffin, Miyata, Kuh, and Darlington synthesis techniques. Introduction to two-port ladder and lattice synthesis. Three-terminal RC network synthesis approximation in the frequency and time domains. Prerequisite: EE 113 or permission of instructor. (Fall 1973 and alternate falls—day; fall 1974 and alternate falls—evening)

216 **Linear Network Synthesis II** (3)
Advanced topics in passive one-port and two-port synthesis. Introduction to n-port synthesis. Active network synthesis using negative resistance, controlled sources, NIC, gyrator, operational amplifiers, and circulators. Synthesis of distributed integrated networks. Computer-aided network optimization. Prerequisite: EE 215. (Spring 1974 and alternate springs—day; spring 1975 and alternate springs—evening)

221 **Physical Electronics I** (3)
Theoretical principles underlying the operation of electronic devices; clas-

sical mechanics and classical statistical mechanics, the quantum theory, wave and matrix mechanics, quantum statistics. Prerequisite: graduate status. (Fall 1973 and alternate falls—evening; fall 1974 and alternate falls—day)

222 **Physical Electronics II** (3)

The Boltzmann transport equation, band theory of solids, time-dependent perturbation theory, group theory. Applications to semiconductor and other solid-state devices such as transistors, tunnel diodes, masers, and lasers. Prerequisite: EE 221. (Spring 1974 and alternate springs—evening; spring 1975 and alternate springs—day)

224 **Quantum Electronics of Masers and Lasers** (3)

(Formerly EE 325 Principles of Lasers)

Basic concepts from quantum mechanics; Einstein coefficients; inversion and pumping mechanisms; rate equations. Resonators, He-Ne laser; organic dye lasers; injection lasers. Nonlinear interactions in lasers. Prerequisite: EE 221 or equivalent. (Fall—evening)

225 **Nonlinear Electronics** (3)

Analysis and design of electronic components and systems operating as switching, sweeping, gating, and pulse generators; study of multivibrators, negative resistance devices and amplifiers, nonlinear operation of oscillators. Prerequisite: EE 122, 153; or equivalent. (Fall 1973 and alternate falls—day; fall 1974 and alternate falls—evening)

226 **Optical Electronics** (3)

Principles of optical systems, aberrations, and optical resonators; quantum theory of radiation, coherence and detection of radiation; lasers, holography, optical (spatial) filtering, and nonlinear optics. Prerequisite: EE 230 or equivalent. (Spring 1974 and alternate springs—day; spring 1975 and alternate springs—evening)

227 **Industrial Electronics** (3)

Applications of electronic devices in industry; continuous and sampled control systems; induction and dielectric heating; timing and counting circuits; reliability and automatic checking equipment; digital control of machine tools. Prerequisite: EE 122 or equivalent and graduate status. (Fall—evening)

228 **High-frequency Electronics** (3)

Design and analysis of the operation of electron-tube, solid-state, crossed-field, space-charge wave, and quantum maser oscillators and amplifying devices that lay the foundation of modern-day communication systems. Prerequisite: EE 230 or equivalent. (Spring—evening)

229 **Precise Optical Measurements** (3)

Optical constants of lens systems; aberration; resolving power; illumination in focal plane; image evaluation, magnification, index of refraction; color and color temperature. Prerequisite: graduate status. (Fall—evening)

230 **Electromagnetic Theory** (3)

Brief review of Maxwell's equations, boundary conditions, electromagnetic potentials, Poynting's theorem, generalized orthogonal coordinates, field equivalence theorems; applications to problems involving reflection, re-

fraction, scattering, and diffraction of electromagnetic waves. Prerequisite: EE 32. (Fall—evening)

231 **Field Analysis and Potential Theory** (3)

General study of the theory of potentials as used to facilitate solution of problems in electromagnetic theory, mechanics, thermodynamics, optics, and gravitation. Emphasis on mathematical methods such as Green's functions, variational methods, principal axis transformations, and multidimensional Fourier transforms. Prerequisite: EE 201; EE 133 or 230. (Fall 1973 and alternate falls—day; fall 1974 and alternate falls—evening)

232 **Electrodynamics** (3)

Special theory of relativity and the Lorentz transformation; Minkowski formulation. Maxwell's equation in the context of special relativity, electromagnetic potentials, and stress tensors. Lagrangian and Hamiltonian formulation, radiation from moving charges. Introduction to quantum electrodynamics. Prerequisite: EE 201, 230. (Spring 1974 and alternate springs—day; spring 1975 and alternate springs—evening)

233 **Microwaves and Components** (3)

High-frequency transmission lines and guided systems; matching techniques; scatter ferrite isolators, gyrators; Faraday rotation; microwave networks; directional couplers; cavity resonators and microwave components. Prerequisite: EE 230. (Fall—evening)

234 **Electromagnetic Wave Propagation** (3)

Retarded time scalar, vector, and Hertz potential. Dipole and dipole array fields; Mie theory of electromagnetic scattering by spheres. Propagation in electrically and magnetically anisotropic media such as dielectric crystals, space-charge plasmas, and ferrites. Wave propagation in inhomogeneous media; Liouville transformation, Lagrange's variation of parameters, WKB solution, invariant imbedding techniques. Propagation in stochastic and dispersive media. Prerequisite: EE 230. (Spring 1974 and alternate springs—evening; spring 1975 and alternate springs—day)

235 **Antennas** (3)

General solution of Maxwell's equations in terms of current sources, the far field approximations, radiation from current distributions, field equivalence theorems, the geometrical optics approximation, aperture antennas, receiving antennas, the theory of arrays, and applications to specific antennas and antenna types. Prerequisite: EE 230. (Fall 1973 and alternate falls—evening; fall 1974 and alternate falls—day)

236 **Plasma Dynamics** (3)

(Formerly Magnetohydrodynamics)

Study of the interaction of fluids with electromagnetic fields. Generalized Navier-Stokes and energy equations, magnetogasdynamic and magnetohydrodynamic approximations, boundary-layer theory, statistical theory of turbulance, generalized Von Karman-Howarth equation, Boltzmann transport equation. MHD generators and devices. Prerequisite: EE 230. (Spring—evening)

238 **Precise Microwave Measurements** (3)

Precise measurement of power, frequency, impedance, wavelength, and attentuation at microwave frequencies; characteristics and Q of resonant de-

vices; calibration of microwave components; design of microwave experiments. Prerequisite: EE 230 or equivalent. (Spring—evening)

239 **Precise Electrical Standards** (3)

Concepts of standards, errors; design of resistance, capacitance and inductance standards; d-c voltage standards; frequency and time standards; dielectric and magnetic materials, attenuation standards, power standards, transfer standards. Prerequisite: EE 160 or equivalent. (Spring—evening)

241 **Information Theory** (3)

Measure of information, noiseless coding; communication channels, channel capacity, the noisy channel coding theorem; bounds on the performance of communication system; the Gaussian and binary symmetric channel; feedback communications systems; rate-distortion theory. Prerequisite: EE 204. (Fall 1973 and alternate falls—evening; fall 1974 and alternate falls—day)

242 **Coding Theory** (3)

(Formerly Information Theory II)

Error-correcting codes; bounds on the performances of error-correcting codes, group codes; syndrome decoding; cyclic codes, their encoding and decoding; Galois fields; BCH codes, burst correction, and threshold-decodeable codes; performance calculations. (Spring 1974 and alternate springs—evening; spring 1975 and alternate springs—day)

243 **Communication Theory I** (3)

Optimum receivers for vector channels and for the additive white Gaussian noise channel; correlation detectors, matched filters; coherent and noncoherent detection and their error probabilities for simplex, orthogonal, and coded systems; bounds on the performance of communications in Gaussian noise; comparison of communications systems. Prerequisite: EE 204 or equivalent. (Fall 1973 and alternate falls—day; fall 1974 and alternate falls—evening)

244 **Communication Theory II** (3)

Schemes for efficient signaling for data sequences; effects of quantizing at the receiver; detection of such signals in colored noise; detection of stochastic signals; the innovations approach in detection and estimation problems; signaling over fading channels and the optimum receivers; diversity techniques and their performances. (Spring 1974 and alternate springs—day; spring 1975 and alternate springs—evening)

245 **Signal Detection and Estimation Theory** (3)

Statistical detection theory, hypothesis testing, sequential detection, estimation theory, maximum likelihood and Bayes methods, estimation of signal parameters and continuous wave forms, Wiener and Kalman filters, applications to the design of optimum receivers, adaptive systems. Prerequisite: EE 241, 244; or equivalent. (Fall—evening)

246 **Digital Communications** (3)

Bounds on the performance of data communications; channels with high dispersion; intersymbol interference and its minimization; Nyquist criteria, eye openings, tail cancellation techniques, correlative coding, transversal equalizers, adaptive equalizers; broadband, noise limited channel; orthogonal codes, simplex codes, bounds on error probability; reception by

matched filters, "Green machine," and other techniques; convolutional codes; decoding by sequential decoding and Viterbi decoding; performance analysis. Prerequisite: EE 243 or equivalent. (Spring—evening)

247 **Communication Systems** (3)

Wiener filters, phase-locked loops and their optimization. Parameter estimation theory with application to optimum demodulation of analog wave forms (DSB-AM, SSB-AM, FM). Comparative analysis of analog modulation systems. Digital communication systems—coherent and noncoherent reception of binary and M-ary signals and their performance analysis. Frequency acquisition and synchronization. Prerequisite: EE 243. (Fall—evening)

248 **Microwave Communication Systems** 3)

Analysis and design of microwave communication systems with emphasis on radar, microwave relay, and satellite systems. Prerequisite: EE 143, 230. (Spring—evening)

249 **Data Telecommunication Networks** (3)

Techniques for the analysis and design of data networks with store, forward, and message switching capability; queing theory, Erlang's formula, priority systems; optimization based on minimization of message delay; synchronous and asynchronous multiplexing; topological problems, graph theory, connectivity and survivable networks, probabilistic graphs; data networks with a central computer; terminal oriented systems. Prerequisite: EE 205 or equivalent.

255 **Optical Processing** (3)

Fourier transforms by diffraction of light, optical spectrum analysis, optical memories and systems, holography and holographic techniques, properties and techniques for photographic reproduction. Prerequisite: EE 201. (Fall—evening)

256 **Environmental Optics** (3)

Distribution of radiation: power converting and transferring systems; UV, luminous, IR spectral sources; daylight; moonlight; luminaries. Environmental boundaries—transmission, reflection, diffusion, refraction, diffraction, dispersion, bleaching, phototropy, polarization. Simulation of organismic responses: response definition—physiological, overt behavioral, perceptual, cognitive. Stimulus-response correlation model; correlating measurement concepts. (Fall—evening)

272 **Discrete Systems** (3)

(Formerly Digital Control Systems)

Sampling processes and theorems; Z-transforms and modified Z-transforms; responses of discrete systems using transformation techniques and state equations; stability criteria; design of digital controller for discrete systems. Prerequisite: EE 203 or equivalent. (Spring—evening)

273 **System Optimization** (3)

(Formerly Optimal Programming and Control)

Parameter optimization problems; theory of minima and maxima. Optimization problems for dynamic systems; calculus of variations; the maximum principle and the Hamilton-Jacobi equation. Optimization problems with constraints; optimal feedback systems. Numerical solution of optimal problems. Prerequisite: EE 202 or equivalent. (Fall—evening)

274 Nonlinear Systems (3)
(Formerly Nonlinear Control Systems)
Definition of linear and nonlinear systems; introduction to approximate analysis of nonlinear systems—describing functions, Krylov and Bogoliubov's asymptotical method and Tsypkin's locus. Forced oscillations—jump resonance. Stability analysis—Liapunov's criterion, Luré's problem, and Popov's method. Prerequisite: EE 203. (Spring—evening)

275 System Identification and Adaptive Systems (3)
(Formerly Stochastic Processes in Automatic Control)
Introduction to the adaptive problem and practical applications. Determining the mathematical representation of systems—the identification problem. Optimal estimation of states in the presence of uncertainties. Adaptive systems. Prerequisite: EE 202, 204; or equivalent. (Fall—evening)

276 Cybernetics (3)
Principles of machines or mechanisms made by men or nature with regard to their ways and forms of possible behaviors: regular, determinate, or reproducible; fundamental concepts of finite differences; changes and transformations as sets of transitions, leading to stability and feedback; statistical concepts of complex systems and blackbox theory; Shannon's information theory; regulation and control of mechanisms. Prerequisite: graduate status and Ap S 115 or equivalent. (Spring—evening)

277 Space Communication Systems (3)
Theoretical and application aspects of space communications, as related to communication satellite systems, scientific satellites, manned space missions, and deep space missions. Prerequisite: graduate status. (Fall—evening)

278 Spacecraft Systems Design (3)
Space environment; structure, propulsion, control, and instrumentation of spacecraft—launch, orbit, transit, and re-entry problems; bioastronautic considerations. Prerequisite: graduate status. (Spring—evening)

281 Medical Instrumentation I (3)
Theory of measurements in biological areas, techniques for electronic measurements on biological specimens, current problems in medical metrology stressing electronic systems. Prerequisite: EE 283 or permission of instructor. (Fall—evening)

282 Medical Instrumentation II (3)
Medical telemetry systems, medical use of the computer, engineering techniques in patient treatment, principles of good medical instrumentation. Prerequisite: EE 283 or permission of instructor. (Spring—evening)

283 Introduction to Medicine for Engineers I: Physiology and Anatomy (3)
Designed to acquaint the engineering student with the physiology of the human body; material based on the curriculum of the School of Medicine and taught from a systems viewpoint; concepts of cellular structure and function integrated into the tissue and organs, which are then related to the various systems of the body; interrelationships of the body systems, i.e., the interaction of the nervous system with the musculoskeletal sys-

tem or the interaction of the respiratory system and its functions with the cardiovascular system. (Fall—day)

284 **Introduction to Medicine for Engineers II: Clinical Medicine** (3)

Clinical aspects of medicine. Further elaboration of physiological systems, such as the endocrine system, renal physiology, gastrointestinal physiology, and others; the separate systems of the body are integrated to present the functioning of the body as an over-all system; considerable interaction with physicians and other medical personnel. Prerequisite: EE 283. (Spring—day)

285 **Engineering in Physical Medicine and Rehabilitation** (3)

Application of engineering theory and techniques to the rehabilitation of handicapped persons; major problem areas and general approaches, as well as specific solutions. Offered cooperatively with personnel from the Social and Rehabilitation Services Administration. Prerequisite: EE 284. (Spring—evening)

286 **Sensory Evoked Potentials** (3)

Physiological significance of the sensory evoked potential, stimulation variables, subject variables, data acquisiton procedures and instrumentation, signal-averaging computers, analysis techniques for the VEP, applications of the VEP. Lectures, discussion, and laboratory. Prerequisite: EE 281, 282, 283, 284; or permission of instructor.

287 **Computer-aided Analysis of Physiological Signals** (3)

Computer analysis of physiological data obtained from the cardiovascular, pulmonary, and nervous systems. Sources and detection of various signals obtained from these systems; algorithmic techniques applicable to the analysis of these signals; students provided with real data, obtained from hospital patients, and required to develop computer software for determining pertinent medical parameters as established by physicians. Prerequisite: EE 281, 282, 283, 284; and a working knowledge of FORTRAN.

288 **Physiological Controls and Systems** (3)

Some applications of control and systems theory in the medical and biological fields. Application of general control and systems theory as applied to physiological systems. Specific applications of control and systems theory to the visual system, respiratory system, cardiovascular system, and musculoskeletal system. Prerequisite: EE 172 or equivalent; EE 281, 282, 283, 284.

298 **Research** (arr.)

Research as arranged. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)

(Fall and spring)

319 **Networks Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

323 **Principles of Microelectronics** (3)

Basic principles, techniques, and processes necessary for understanding microelectronics. Semiconductor physics, phase diagrams, crystal growth, epitaxy, vacuum techniques, thin-film deposition, diffusion, oxidation,

junction formation, masking, and properties of thin films and materials. Prerequisite: EE 222 or equivalent.

329 **Electronics Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

339 **Fields and Waves Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

349 **Communications Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

371 **Simulation Methods for System Analysis** (3)
Survey of simulation languages. Techniques of model building for material- and machine-based systems. Treatment of these systems with notion of transactions and states. Modeling the dynamic processes of growth problems. Analog, hybrid, and digital methods for simulation treated by means of case studies; speed and cost of alternate computing procedures. Project-type problems used to illustrate simulation methods. Prerequisite: CS 278 or permission of instructor. (Fall—evening)

372 **Analysis and Control of Large Systems** (3)
Systems as multistage decision processes. Analytical concepts of model-making and matrix representations of large systems. Approximation by models of lower dimension—reduction to simplified models; decentralized systems. Differential games; computation of saddle points; construction of an equilibrium point. (Spring—evening)

379 **Controls and Systems Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

389 **Medical Engineering Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

COMPUTER SCIENCE COURSES

201 **Introduction to Computer Systems I** (3)
Introduction to programming of digital computers in a macro-assembly language and higher-level procedural languages; techniques in machine control and memory addressing; data structures, list and string processing in data processing; characteristics and choice of data processing language; introduction to PL/1 language; sorting, searching, and merging of data. Prerequisite: EE 51 or equivalent; or permission of instructor. (Fall—evening)

202 **Introduction to Computer Systems II** (3)

Introduction to combinational and sequential logic networks; analysis and synthesis of switching circuits using Boolean algebra; minimization techniques in the design of logical circuits; number systems and arithmetic in digital computers, digital computer architecture and the design of functional sub-units; design of memory, arithmetic, and units comprising a digital computer; information flow, timing, and control in large digital computers. Prerequisite: CS 201 or permission of instructor. (Spring—evening)

215 **Computer Graphics and Pattern Recognition** (3)

Graphical data processing and display systems; software systems needed for graphical I/0; digital and analog display methods; scanning, sampling, digitizing, and transmission of data; concept analysis; linear and area transforms; geometry, topology, and syntax of pictures; resolution analysis; signal-to-noise problems; transformations, projections, and the hidden-line problems. Prerequisite: EE 157 or equivalent and permission of instructor. (Fall—evening)

216 **Information Retrieval Systems** (3)

Information organization and retrieval of natural language data by digital computer systems; statistical, syntactic, and logical analysis of natural language used for retrieval systems; dictionary systems including thesaurus look-up and phrase structures; searching strategies and cataloguing. Input preparation and output structures; large-scale file structures and operating systems required for their use. Prerequisite: EE 157 or equivalent. (Spring—evening)

231 **Finite State Machines** (3)

Analysis and design of sequential networks, state diagrams, flow table, equivalence of states, races, transition maps, output tables, hazards, synchronous and asynchronous sequential networks. State assignment problem, partitions, partition pairs, information flow inequalities, clocks, state realizations, parallel and serial decompositions, machine networks and decompositions. State identification. Prerequisite: EE 153. (Fall—evening)

232 **Finite Automata** (3)

Effectively computable functions, recursive functions, regular expressions, single- and multiple-tape Turing machines, probabilistic automata, neural nets, reliability of automata, artificial intelligence, learning machines, threshold logic, adaptability, pushdown automata. Prerequisite: CS 231, 237. (Spring—evening)

237 **Computing Systems** (3)

Organization of large digital computer systems. Design of high-speed arithmetic units. Random access and associative memories; rotational storage devices; computer control and interrupt structures. Input-output channels and interfacing problems. Communications in digital computers. Introduction to multiple access and time-sharing systems. Prerequisite: EE 154. (Fall 1973 and alternate falls—day; fall 1974 and alternate falls—evening)

238 **Advanced Computing Systems** (3)

Multiple access computer systems, multiprogramming, multiprocessing, and time-sharing. Real-time computation; man-machine communication

problems, and remote I/0 devices. Memory allocation and protection. Secondary storage organization and retrieval. Effects of storage on program operation. Design of file structures. Analytical time-sharing models, scheduling schemes, and user response time. Prerequisite: CS 237. (Spring—evening)

240 **Theory and Practice of Microprogramming** (3)

Basic concepts, techniques, and theory of microprogramming as applied to the implementation of control systems for sequential machines. Microprogramming languages, assemblers, and hardware simulators, including specific applications of these to the design of current computer systems and their interfaces with real-time systems. Prerequisite: CS 237, 263. (Spring—evening)

263 **Digital Computer Programming Systems** (3)

Introduction to the design of computer software and software systems. Design of assemblers and monitor systems. Communication between components of systems. Design of loaders, input-output control systems, and utility systems. Prerequisite: EE 157 or permission of instructor. (Fall 1973 and alternate falls—evening; fall 1974 and alternate falls—day)

264 **Design of Compilers and High-level Languages** (3)

Design of high-level, problem-oriented languages. Grammar, syntax, semantics, and pragmatics as they affect the design of translators and compilers. Context-free languages, pushdown lists, polish-string notation, and additional programming methods used in the construction of compilers and translators. Prerequisite: CS 263 or permission of instructor. (Spring 1974 and alternate springs—evening; spring 1975 and alternate springs—day)

265 **Systems Programming** (3)

Batch processing software systems and their limitations; multiprogramming in fixed and variable partitions; data bases and table-driven software; use of list processing in systems programming; multiprocessor systems and fail-soft systems; I/0 processing for remote batch and on-line time-sharing systems; introduction to the computer as a utility; real-time programming in a multiprogram environment; system subprograms as reentrant and recursive code. Prerequisite: CS 263 or equivalent. (Fall—evening)

278 **Analog and Hybrid Computers** (3)

Analog computer components and electronics. Slow analog computer solutions of linear and nonlinear differential equations. System simulation and modeling on the analog computer. Introduction to the iterative analog computer. Transfer function simulation and use in control theory. The hybrid computer, digital logic and digital computer control. Digital-to-analog and analog-to-digital converters and interfaces. Optimization methods on a hybrid computer. Parameter variations and searching methods. Prerequisite or concurrent registration: EE 154 or permission of instructor. (Spring 1974 and alternate springs—day; spring 1975 and alternate springs—evening)

284 **Applications of Numerical Methods** (3)

Numerical methods in scientific and engineering problems; development of computer algorithms for the solution of numerical problems; error analysis and sensitivities of numerical methods; use of a procedural computer

language in the solution of numerical methods; computer methods for simultaneous equations, interpolation, differentiation and quadrature, solution of ordinary differential equations, boundary-value problems, partial differential equations, and linear algebra. Prerequisite: EE 51 or equivalent and permission of instructor. (Spring—evening)

*285 **Approximation of Functions and Data Representations** (3)

Review of linear spaces; least squares, orthogonal functions; nonlinear techniques, gradient search methods; parameter estimation with discrete data; Tchebysheff approximation; approximation and curve fitting by Spline functions and Bernstein polynomials.

298 **Research** (arr.)

Research as arranged. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)

(Fall and spring)

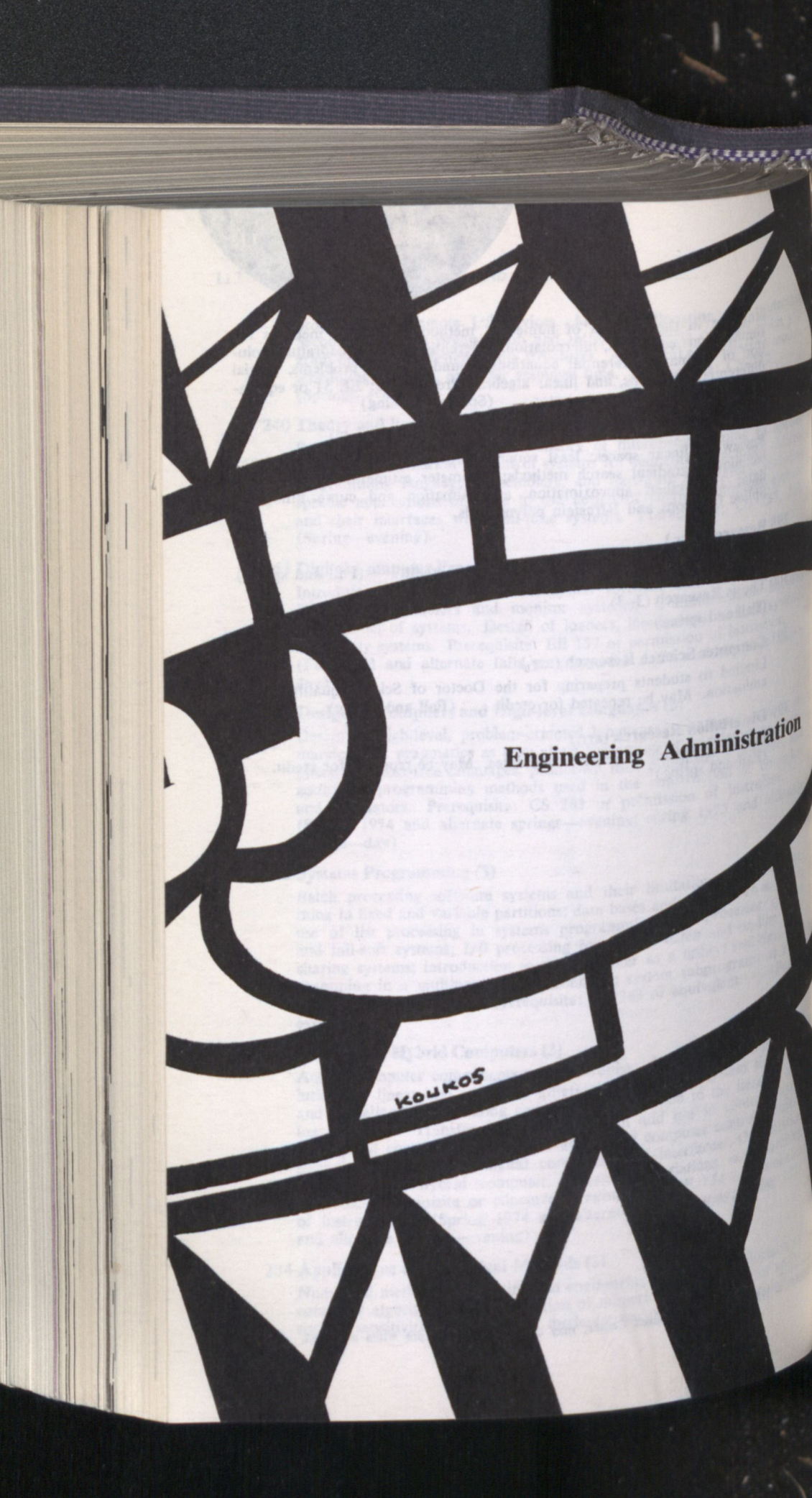
391 **Computer Science Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.


Engineering Administration
KOUKOS

Engineering Administration*

Professors P.A. Crafton *(Chairman)*, H.E. Smith, P.S. Shane, John Kaye, Kenneth Johnson
Professorial Lecturers D.P. Boyd, B.B. Bright, G.M. Coburn
Associate Professor J.B. Smith, Jr.
Associate Professorial Lecturer L.S. Rotolo
Assistant Professorial Lecturers R.W. Stroup, R.K. Trehan

GRADUATE FIELDS AND AREAS OF CONCENTRATION

Administration of Research and Development
Construction Management
Engineering Administration
Environmental Management
Management Information Systems
Marketing of Technology
Systems Analysis
Technology and Public Affairs

Programs in Engineering Administration lead to the degrees of Master of Engineering Administration and Doctor of Science. Programs in Administration of Research and Development, Construction Management, Environmental Management, Management Information Systems, Marketing of Technology, and Technology and Public Affairs lead to the degree of Master of Engineering Administration. Programs in Systems Analysis lead to the degrees of Master of Science and Doctor of Science.

THE MASTER OF ENGINEERING ADMINISTRATION DEGREE PROGRAM

The principal objective of the program leading to the degree of Master of Engineering Administration is to prepare students whose undergraduate background training was in engineering, mathematics, or science for positions of managerial responsibility in technological and scientific organizations, and in industry, government, or the armed services.

The program is designed to help the student achieve a broad understanding of the administrative process. Although years of experience are required to develop the skills, insight, and maturity of judgment which distinguish an effective manager in technological and scientific organizations, a graduate professional management curriculum can give the student an effective start as a manager. The curriculum provides an opportunity for the student to gain an understanding and to develop some useful managerial skills in the functional areas of engineering administration. One of the major purposes is to assist the student in forming the habit of examining problems from an over-all administrative point of view. The individual's own particular experience, and the explicit process of relating this experience to the theoretical structure which he starts to build in graduate study, provides each student with a personal frame of reference through which he may interpret management in a rapidly changing world.

Successful education for engineering administration implies a clear statement of what it is that an engineering manager must do, an analysis of the broad

*Staff of instruction for the academic year 1972–73.

functions involved in management, and a detailing of modern methods useful in making and executing decisions in the management of technological and scientific organizations. It is the aim of the School, therefore, to keep alive a spirit of general inquiry and a problem-solving orientation.

The management of technological organizations is one of the most difficult challenges of our times. The professional engineering manager today must understand not only the currently developing technologies but also the rapidly changing marketplace where these technologies are applied for society's benefit. The engineering administrator is the link between these dynamic technologies and the needs of society in general.

In summary, the program of study has for its objective an educational experience which will contribute to the development of managers possessing a combination of technical know-how and administrative skill.

ADMISSION

In addition to the requirements for admission to graduate study (see pages 22–24) applicants for programs leading to the degree of Master of Engineering Administration must have an adequate knowledge of the principles of human relations, the fundamentals of engineering economic analysis, and the fundamentals of quantitative methods. This requirement can be met by satisfactory completion of the following undergraduate courses or approved equivalents: E Ad 150, *Introduction to Technical Management;* E Ad 160, *Introduction to Engineering Economic Analysis;* and E Ad 170, *Basic Quantitative Methods for Engineering Administration.* A student is required to earn the grade of *C* or better (unless the requirement is stipulated to be a grade of *B* or better upon his admission) in each undergraduate prerequisite course. If this scholarship requirement is not met the student is barred from further enrollment. A student is not permitted to repeat any of the undergraduate prerequisite courses. Credit for prerequisite courses is not applicable toward the degree of Master of Engineering Administration.

ADMINISTRATION OF RESEARCH AND DEVELOPMENT

The objective of the program of study in the field of Administration of Research and Development is to prepare students for responsible managerial positions in organizations conducting technological or scientific research and development and in organizations planning and administering programs of technological or scientific research and development.

REQUIRED COURSES

A program of study consisting of a sequence of courses is prescribed for each student in conference with an adviser. Students are required to complete E Ad 211–12, 255, 269, 295, and 299–300 (for those electing the thesis program) or 297 (for those not electing a thesis); the remainder of the program is selected from courses in the Department of Engineering Administration.

CONSTRUCTION MANAGEMENT

Construction Management encompasses those managerial functions in an organization that plans and executes major construction work. This can take place in the field, in the project office, or in a main office. Due to the inherent com-

plexity of present-day engineering, engineers need to know management as well as basic planning, design, and construction methods. They need to know construction developments, problems of contracts and specifications, techniques of scheduling and control, estimating, labor relations, and industrial or management psychology.

The objective of the program of study in the field of Construction Management is to prepare the engineer for the task of marshalling men, materials, machines, and money against time, cost, weather, and human nature to plan and build structures.

REQUIRED COURSES

Students are required to complete E Ad 211–12, 241, 242, 269, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected, with the approval of the student's adviser, from courses in the Department of Engineering Administration, the Department of Civil, Mechanical, and Environmental Engineering, and other departments of the University.

ENGINEERING ADMINISTRATION

Study in engineering administration provides the conceptual depth in management practice and knowledge needed by technical and scientific personnel who are confronted with increasing demands and mounting complexities. Technical knowledge is complemented by an understanding of theory and practice in management action. Engineering management is a logical development of a technological society. The program of study is designed to provide engineers with a knowledge of and proficiency in the administration of engineering and science. It emphasizes use of deliberative, purposive study of general administrative problems and opportunities, as well as the study and use of specific knowledge and methods needed to solve administrative problems and to explore opportunities.

REQUIRED COURSES

Analysis, case study, and quantitative approaches are emphasized in addition to technical reviews of administration. A program of study consisting of an integrated sequence of courses is prescribed for each student in conference with an adviser. Students are required to complete E Ad 211–12, 269, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is elective. E Ad 211–12 and 269 must be taken prior to the elective courses, except that in certain cases permission may be obtained for concurrent registration. Electives are chosen from the Department of Engineering Administration and other departments of the University, but no more than two courses may be chosen from other departments.

ENVIRONMENTAL MANAGEMENT

The objective of the program of study in the field of Environmental Management is to prepare students for responsible managerial positions in organizations conducting environmental control and in organizations planning and administering programs in the prevention and control of environmental pollution.

REQUIRED COURSES

Students are required to complete E Ad 211–12, 221–22, 261, 269, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected, with the approval of the student's adviser, from appropriate courses in the Department of Engineering Administration, the Department of Civil, Mechanical, and Environmental Engineering, and other departments of the University.

MANAGEMENT INFORMATION SYSTEMS

The objective of the program of study in the field of Management Information Systems is to provide the developing manager in technological and scientific organizations with the understanding and competence in the managerial use of systems that furnish quickly to management information in the variety of forms that are required for day-to-day operations and long-range decisions.

REQUIRED COURSES

Students are required to complete E Ad 211–12, 269, 295, 321, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected from courses in the Department of Engineering Administration, and, with the approval of the student's adviser, in other departments of the University.

MARKETING OF TECHNOLOGY

As the American economy matures and American citizens survey the broad spectrum of options available to them, it is apparent that scientific and engineering outputs must be sold in world-wide competition both at home and abroad. The trained specialist is becoming more important than ever before in performing the selling function.

The objective of the program of study in the field of Marketing of Technology is to prepare students for responsible positions in marketing technical products and services.

REQUIRED COURSES

Students are required to complete E Ad 211–12, 269, 293, 294, 311, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected from courses in the Department of Engineering Administration.

TECHNOLOGY AND PUBLIC AFFAIRS

The objective of the program of study in the field of Technology and Public Affairs is to prepare students for responsible positions requiring managerial decision-making on matters that involve the impact of technology on public policy and that concern the general interrelationship between modern technology and public affairs.

REQUIRED COURSES

Students are required to complete E Ad 211–12, 269, and 299–300 (for those

electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected, with the approval of the student's adviser, from courses in the Department of Engineering Administration, the National Law Center, and other departments of the University.

THE MASTER OF SCIENCE DEGREE PROGRAM

SYSTEMS ANALYSIS

The program of study in the field of Systems Analysis leads to the degree of Master of Science and is administered by the Department of Engineering Administration.

The objective of this program is to prepare students whose undergraduate background training was in engineering, mathematics, or science for responsible positions in the practice of systems analysis.

ADMISSION

The admission requirement for the Master of Science degree in the field of Systems Analysis is a Bachelor's degree in engineering, mathematics, or the sciences from a recognized institution.

REQUIRED COURSES

Students are required to complete E Ad 281, 282, 283, 284, and 299–300 (equivalent to 6 semester hours for those electing a thesis) or 9 semester hours of approved courses in lieu of E Ad 299–300. The remainder of the program is selected, with the approval of the student's adviser, from courses in the Department of Engineering Administration and other departments of the University.

DOCTORAL STUDY

Programs in Engineering Administration and in Systems Analysis leading to the degree of Doctor of Science provide advanced study and research to enable gifted students to extend their fields of knowledge and to enhance their career opportunities in research analysis, management, administration, or education.

ADMISSION TO DOCTORAL STUDY

All applicants must meet the general requirements for admission to doctoral study stated on page 27.

Applicants for doctoral study in Engineering Administration must have a Master's degree, with a superior record of academic achievement in Engineering Administration or a related field. Applicants for study in Systems Analysis must have a Master's degree, with a superior record of academic achievement in engineering, science, or mathematics.

As part of the admissions condition for doctoral study (1) in Engineering Administration, superior performance on the comprehensive examination for the degree of Master of Engineering Administration, or (2) in Systems Analy-

sis, superior performance on the comprehensive examination for the degree of Master of Science (Systems Analysis), is required before final approval of the course work for the doctoral program is granted. The examinations must be taken no later than the first semester of doctoral study. Outstanding professional performance is also considered in evaluating all doctoral applicants.

PROGRAMS OF STUDY

Major fields leading to the degree of Doctor of Science are available in both Engineering Administration and Systems Analysis. In addition to the major field, two minor areas of concentration are normally required, which may be chosen from the areas administered by this Department or from appropriate areas available in other departments of the University. The general requirements for doctoral study are stated on pages 27–31.

COURSES

UNDERGRADUATE

150 Introduction to Technical Management (3)

The interrelationships of engineering, science, and management; conceptual foundations for interaction of human factors in individuals, groups, and the social environment of engineering activities. Familiarization with typical activities of engineering managers and with factors bearing on the motivation of engineers and on engineers as managers. Social and organizational factors relevant to the management of engineers. This course is preliminary to the complete management process studied in E Ad 211–12.

160 Introduction to Engineering Economic Analysis (3)

Influence of the time element: interest rates, equivalence, present worth, annual cost, internal rate of return. Incremental analysis. Data for analysis. Characteristics of an accounting system: balance sheet, profit and loss statement, depreciation, allocation of fixed costs, financial statement analysis.

170 Basic Quantitative Methods for Engineering Administration (3)

An introductory treatment of quantitative tools and techniques important in administration, with emphasis on their application. Concepts of probability and decision-making in administrative decisions. (Fall and spring)

GRADUATE

201 Management for Engineers and Scientists (3)

For students in programs outside the Department of Engineering Administration. Basic principles of engineering administration; management functions of planning, organizing, directing, and controlling; emphasis on industrial, scientific, and engineering environments. May not be taken by candidates for degrees in the Department of Engineering Administration; open to advanced undergraduate students with permission of instructor.

204 Administration of Engineering Contracts (3)

Study of the total contracting process, including initial budget preparation and justification, actions leading to the execution of a contract, and administration of the contract to completion; considered from the viewpoints

of the industrial and government buyer and the seller of technical materials and services. (Fall and spring)

207 **The Personnel Function for Engineering Administrators** (3)

Principles of managing human talent, the most vital resource in engineering or research; emphasis on principles, theory, and practical considerations of the personnel function for engineering managers, with practical applications in an engineering administration environment. (Fall and spring)

210 **Engineering Law** (3)

Legal principles and procedures of interest to engineers, the American legal system, contracts and specifications, liability of professional engineers, antitrust problems, agency relationships, negotiable instruments, patent and proprietary rights, special problems in research and developmental contracts. (Fall and spring)

211–12 **Engineering Administration** (3–3)

Comprehensive and systematic study of the administrative process with emphasis on industrial, scientific, and engineering environments. Planning: objectives, prediction, policies, plans and characteristics of plans. Organizing: theory of organization, structure, authority, specialization, delegation, staff and committees. Directing: leadership, managing human and material resources. Controlling: setting standards, evaluating performance, using system feedback data for correction and improvement. (E Ad 211 and 212—fall and spring)

213 **Case Analysis in Engineering Administration** (3)

Written analysis and class discussion of cases involving application of the principles of engineering administration and use of the scientific method. (Fall 1974 and alternate falls)

221–22 **Environmental Management** (3–3)

Integration of social, technical, economic, and political forces which shape environment; review of government programs to combat air, water, solid waste, noise, and thermal pollution; conducting and analyzing a regional ecology system; legal aspects of environmental management; economic and technological impacts of environmental policies; effects of chemicals on ecology. Systematic waste management; social, political, and economic reactions to environmental policies. (Academic year)

231 **Program Management** (3)

Management science, the systems approach and traditional managerial concepts as applied to government and industry activities under program managers. Computer simulation of the management of a project to develop an earth satellite to the point of launch (GREMEX), with student participation. (Spring)

241 **Construction Management I** (3)

Contract negotiations; aspects of contracts and specifications important to management. Construction estimating and cost allocation in heavy and building construction; budgeting and accounting concepts. (Fall)

242 **Construction Management II** (3)

Construction administration: organization, construction planning, and scheduling. Industrial relations and human factors in construction man-

agement, work measurement, programming and progressing, project management and control. (Spring)

243 **Construction Management III** (3)

Managerial problems associated with advanced methods of construction and equipment; trend of mechanization; equipment policy and depreciation.

253 **Production Management** (3)

Planning, organizing, and control of production; forecasting techniques; material management; methods of loading and scheduling production processes; electronic methods in production control. Organization and administration of the plant engineering function with emphasis on maintenance control programs. Prerequisite: E Ad 269 or permission of instructor. (Spring)

254 **Automatic Data Processing Systems** (3)

Logic of computers, arithmetic and control units, systems analysis for data processing applications, systems design, systems economics, relation to scientific decision processes. (Fall and spring)

255 **Administration of Research and Development** (3)

Study of contemporary practices of administrators of scientific and engineering research and development; the relation of these studies to accepted managerial concepts, and their effect on contemporary managerial hierarchies and organizational structures. (Fall and spring)

261 **Economic Analysis in Engineering Planning** (3)

Important concepts and theories employed in economic analysis of engineering projects. Application of various analytical processes. Detailed practice in pursuit of solutions to, and adjustment of, persistent and current problems in this field. Prerequisite: E Ad 269 or permission of instructor. (Fall and spring)

269 **Elements of Decision-making and Problem-solving** (3)

History and orientation of quantitative methods; concept of quantitative decision-making; decision criteria under certainty, risk, and uncertainty; game theory; utility; the time factor; replacement models. Prerequisite: E Ad 170 or equivalent. (Fall and spring)

281–82 **Systems Analysis and Management** (3–3)

Systems analysis as applied to management, especially the planning function. Properties, nature, structure, and organization of systems; conceptualization of the total system. Operational functioning and description of systems. Objectives, alternatives, models, criteria, and feedback as analytical considerations. Enterprises, input-output structure of the U.S. economy and organizations from the systems point of view. Case analyses. (Academic year)

283 **Systems Engineering I** (3)

Concept of system structure and organization. Linear and nonlinear systems analysis; dynamics and stability of systems. Introduction to optimization methods. (Fall)

284 **Systems Engineering II** (3)

Design of systems; simulation and modeling of systems; adaptive systems; system optimization. (Spring)

285 **Seminar: Administrative Problems** (3)

Individual analysis of complex administrative problems, with group evaluation and discussion. Prerequisite: 18 semester hours of graduate credit. (Fall and spring)

293 **Technical Enterprises** (3)

Essential features of technology-based companies; basic issues of planning, organizing, financing, and managing a new venture from the entrepreneur's point of view; case studies and a detailed plan for a venture. Designed for those within technical firms and those within government who depend on technical firms as suppliers. (Fall)

294 **Marketing of Technology I** (3)

Marketing of industrial goods and high-technology projects; emphasis on the federal government as the customer. Products, channels, organization, selling, technical service, and control; case analyses. (Spring)

295 **Management of Technical Information** (3)

Needs and objectives of technical information systems, functions involved in technical information, storage and retrieval, abstracting, computer usage in technical information systems, system organization. (Spring)

297 **Problems in Engineering Administration** (3)

Project course providing the student with the opportunity to apply the various concepts and tools previously studied to the solution of a problem in engineering administration. Students work individually or in small groups, each on a problem proposed by the student and approved by the instructor. (Fall and spring)

298 **Research** (arr.)

Basic or applied research in engineering administration or systems analysis. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)

(Fall and spring)

311 **Marketing of Technology II** (3)

Continuation of E Ad 294. Special attention to marketing research, negotiation, and international marketing. Required for Master's degree candidates in the Marketing of Technology program. Prerequisite: E Ad 294. (Fall 1974 and alternate falls)

321 **Management Information Systems** (3)

Study and development of information systems used by middle and higher management of technological and scientific organizations in the control of many facets of the organization at all managerial levels. Required for Master's degree candidates in the Management Information Systems program. (Fall 1973 and alternate falls)

386 **Advanced Topics in Management** (3)

Reading and discussion of classic and important recent literature concerning the philosophy and application of management principles. (Fall 1973 and alternate falls)

387 Technological Forecasting (3)

Concepts and methodology: normative and exploratory forecasting, resource allocation and forecasting, technology transfer, technological change and its effects on forecasting, technology assessment. (Spring 1974 and alternate springs)

388 Cost Effectiveness (3)

Concepts of evaluation of engineered systems, current methods and trends in methodology, system resource requirements, probability and decision theory in cost effectiveness studies, systems approach to cost effectiveness studies. (Spring 1975 and alternate springs)

398 Advanced Reading and Research (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.)

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

Operations
Research

Operations Research*

Professor W.H. Marlow *(Chairman)*
Professorial Lecturer Byron Cosby, Jr.
Associate Professors Donald Gross, N.D. Singpurwalla, C.M. Harris, J.E. Falk *(Research)*, A.V. Fiacco *(Research)*, G.P. McCormick *(Research)*
Associate Professorial Lecturers Victor Selman, Charles Anello, John Waller, A.J. Clark, C.C. Sherbrooke
Assistant Professorial Lecturers P.D. Robers, J.L. Horowitz, C.R. Margenthaler, J.D.L. Watson

Programs in Operations Research lead to the degrees of Master of Science and Doctor of Science.

MASTER'S STUDY

The objective of the program in Operations Research is to prepare students with appropriate undergraduate backgrounds for study in depth of analytically oriented techniques of management decision-making and their applications.

Expanded scientific, statistical, and mathematical knowledge, combined with growing needs in technological as well as social areas, have created increased demands for individuals trained in operations research. The discipline of operations research uses scientific principles supported by statistical and mathematical methodology to study the function and structure of complex technical, industrial, military, and social systems in an effort to evaluate the probable effects of proposed courses of action, to establish criteria to judge the effectiveness of these courses, and to assist in the making of optimal decisions. The program in Operations Research provides a scientific basis for solving problems involving the interaction of many factors and organizational components in the interests of the whole or total problem. This breadth of interest is an example of the "systems approach" in the sense that a system is an interconnected complex of functionally related components. Most operations research efforts begin with specific aspects of the general problem in such a way that it is possible to proceed to consideration of the system as a whole. Just as the engineer may start with the study of subsystems or components of a general problem, so may the operations research analyst.

ADMISSION

In addition to the requirements for admission to graduate study (see pages 23–24), the applicant for the program in Operations Research leading to the degree of Master of Science must have an adequate knowledge of probability and statistics. This requirement can be met by satisfactory completion of the following undergraduate courses or approved equivalents: Ap S 115, *Probabilistic and Statistical Methods in Engineering;* Stat 191, *Probabilistic Methods for Operations Research;* and Stat 192, *Statistical Methods for Operations Research.*

* Staff of instruction for the academic year 1972–73.

REQUIRED COURSES

Core courses required in the field of Operations Research are OR 201, 202, 209, 210, and 299–300 (for those electing a thesis) or 291 (for those not electing a thesis). Students must complete OR 201, 202, 209, and 210 before attempting any other courses; however, in certain cases, permission may be granted for concurrent registration. Students electing OR 291 normally complete this course in the last semester of the program. The remainder of the program is selected, with the approval of the adviser, generally in an area of concentration from courses in the Department of Operations Research. Appropriate courses from other departments of the University may also be approved as electives.

AREAS OF CONCENTRATION

The philosophy of the Department of Operations Research is to provide programs flexible enough to accommodate those whose interests lie in applications and those whose interests lie in theory. Examples of areas of concentration follow:

General Operations Research

OR 251: Linear Programming
OR 261: Theory of Games
OR 277: Queuing Theory
OR 279: Inventory Control

With the approval of the adviser, other courses may be elected from the Department.

Management Science

OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 251: Linear Programming
OR 261: Theory of Games
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 279: Inventory Control

With the approval of the adviser, courses may be elected from the departments of Business Administration, Economics, Engineering Administration, and Management Science.

Mathematical Modeling in Information Systems

OR 251: Linear Programming
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 277: Queuing Theory

With the approval of the adviser, courses may be elected from the departments of Electrical Engineering and Computer Science and Management Science.

Mathematical Optimization

OR 251: Linear Programming
OR 252: Nonlinear and Dynamic Programming
OR 261: Theory of Games
OR 275: Introduction to Scheduling

With the approval of the adviser, courses may be elected from Applied Science and the Department of Mathematics.

Model Building for Transportation Flows

OR 231: Theory of Traffic Flow
OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 251: Linear Programming
OR 252: Nonlinear and Dynamic Programming
OR 273: Digital Systems Simulation
OR 277: Queuing Theory
OR 281: Reliability Theory I

With the approval of the adviser, courses may be elected from the departments of Civil, Mechanical, and Environmental Engineering; Engineering Administration; Urban and Regional Planning; and from the National Law Center.

Operations Research in Industrial Engineering Systems

OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 251: Linear Programming
OR 252: Nonlinear and Dynamic Programming
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 275: Introduction to Scheduling
OR 277: Queuing Theory
OR 279: Inventory Control
OR 281: Reliability Theory I

Quantitative Decision-making for Public Policy

OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 251: Linear Programming
OR 261: Theory of Games
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation

With the approval of the adviser, courses may be elected from the departments of Civil, Mechanical, and Environmental Engineering; Economics; Public Administration; and Urban and Regional Planning.

Stochastic Modeling

OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 277: Queuing Theory
OR 279: Inventory Control
OR 281: Reliability Theory I

With the approval of the adviser, courses may be elected from the Department of Statistics.

DOCTORAL STUDY

Programs in Operations Research leading to the degree of Doctor of Science provide advanced study and research to enable the student to extend his field of knowledge and to enhance his career opportunities in research, analysis, management, administration, or education.

ADMISSION

In addition to the general requirements for admission to doctoral study (see page 27), the applicant for the doctoral program in Operations Research must have a Master's degree, with a superior record of academic achievement. Outstanding professional performance is also considered in evaluating applicants.

PROGRAMS OF STUDY

Doctoral programs are planned so that the student may obtain an adequate breadth in operations research and sufficient depth in areas of specialization to permit him to complete a dissertation that will be a significant contribution to the field. Possible areas of concentration include mathematical programming, inventory, queuing, reliability, and traffic theory. In addition to the major in Operations Research, two minor areas of concentration are normally required. One minor area must be in Applied Science, Mathematics, or Statistics. The second minor area may be chosen from appropriate areas available in other departments of the University, such as Business Administration; Civil, Mechanical, and Environmental Engineering; Economics; Electrical Engineering and Computer Science; Engineering Administration; Health Care Administration; Management Science; Mathematics; and Urban and Regional Planning. The general requirements for doctoral study are stated on pages 27–31.

GRADUATE COURSES

201 **Survey of Operations Research Methods I** (3)

Basic concepts and techniques of operations research as applied to problems in industrial, governmental, and military decision-making. Allocation models including the simplex procedure of linear programming, transportation and assignment models, queuing theory, inventory theory, game theory, and decision-making under uncertainty. Prerequisite: Ap S 115 or equivalent. (Fall and spring)

202 **Survey of Operations Research Methods II** (3)

Simulation, Monte Carlo techniques; networks; integer programming; introduction to nonlinear programming; dynamic programming; Markov chains; reliability and replacement. Prerequisite: OR 201 or equivalent. (Fall and spring)

209 **Mathematics for Operations Research I** (3)

Applied linear algebra: systems of linear equations, vector spaces, linear transformations and matrices, inner products and orthogonality, reduction

to Jordan canonical form, resolution of definiteness of quadratic forms, generalized matrix inverses, theorems of the alternative. Applied real analysis: neighborhood topology, functions of several variables, differentiation, convexity, differentiable transformations, classical optimization theory, convergence, topics in integration. (Fall)

210 **Mathematics for Operations Research II** (3)

Applied complex analysis: functions of a complex variable, contour integration, singular points and residues, power series, conformal mapping, algebraic applications, inversion integrals in operational mathematics. Linear systems: solution of differential equations, difference equations, differential-difference equations by direct and operational Laplace transform, z-transform, and generating function methods. Numerical mathematical methods: approximate formulas, numerical solution of linear systems, iterative solution of nonlinear systems. (Spring)

231 **Theory of Traffic Flow** (3)

Definitions and measurement of traffic stream parameters; dynamic theories: follow-the-leader models of traffic flow; kinematic theories and fluid analogies; traffic cybernetics; statistical distributions and queuing theory; stochastic approaches to static delay problems; simulation of traffic problems. Prerequisite: Ap S 115 or equivalent. (Spring 1975 and alternate springs)

232 **Applications of Linear and Nonlinear Optimization Theory** (3)

Introduction to penalty-function and arc methods for solving linear and nonlinear optimization problems through use of existing computer codes. Formulation of optimization models in application areas of structural design, nutrition, pollution control, resource allocation, biology, economics, psychology, statistics, and chemical processes. Admission by permission of instructor. (Fall)

251 **Linear Programming** (3)

Basic computational, theoretical, and applied areas with emphasis on the general linear programming problems; simplex procedures; duality problems; parametric linear programming and sensitivity analysis, transportation problems. (Fall and spring)

252 **Nonlinear and Dynamic Programming** (3)

Basic topics in optimization theory, including convex sets and functions, optimality criteria, local and global solutions, and algorithms. Methods for solving unconstrained problems; linearly and nonlinearly constrained problems and sequential problems, including dynamic programming problems. Prerequisite: OR 202 or 251; or permission of instructor. (Spring)

261 **Theory of Games** (3)

Study of mathematical models with applications to the relationships among independent competitive entities (persons or organizations in environment of competition, bargaining, bidding), selection of optimum strategies, minimax concept, connections with linear programming and decision functions, two-person and n-person zero and nonzero sum games. (Fall)

271 **Forecasting Techniques** (3)

Regression analysis and its use as a forecasting tool; uses and limitations of time-series analysis in forecasting; business indicators and index num-

bers. Introduction to spectral theory: correlogram, periodogram, and spectral density. Prerequisite: Ap S 115 or equivalent. (Spring 1974 and alternate springs)

273 **Digital Systems Simulation** (3)

Monte Carlo techniques, random number and random deviate generation. Simulation languages. Operating considerations, including model validation, steady-state, and statistical analyses of simulation output. Applications in inventory, queuing, and production scheduling. Prerequisite: Ap S 115 or equivalent and knowledge of FORTRAN. (Spring 1975 and alternate springs)

275 **Introduction to Scheduling** (3)

Theory of scheduling with emphasis on industrial applications; assembly line balancing; sequencing and scheduling of jobs in machine shops. Mathematical optimization, heuristic programming, and computer simulation approaches to these problems are examined. Prerequisite: OR 202 or permission of instructor. (Fall 1974 and alternate falls)

277 **Queuing Theory** (3)

Single-channel exponential models, including waiting times, transient solutions, and busy periods. Additional Markovian single- and multiple-channel models, including birth-death processes, finite sources, bulk queues, Erlangian models, priorities and other disciplines, and series queues. Models with general arrival and/or service patterns. Model-building and basic solution techniques are stressed in addition to formal theoretical developments. (Spring)

279 **Inventory Control** (3)

Application of mathematical techniques to decisions regarding when and how much to produce or purchase. Various mathematical models of inventory systems with deterministic and stochastic demands, continuous and periodic review policies, multi-item models with constraints. Demand uncertainty and forecasting in inventory models. Prerequisite: Ap S 115 or equivalent. (Fall)

281 **Reliability Theory I** (3)

Review of estimation procedures, regularity conditions for maximum likelihood estimators, limit theorems, order statistics, and extreme value theory; probabilistic derivation of failure models from hazard-rate and renewal-theoretic considerations; topics in censored, truncated, and accelerated life tests for exponential and extremal types of distributions emphasizing linear and minimum-risk invariant estimators; sequential analysis and sequential life testing in both classical and Bayesian frameworks; nonparametric characterization of failure distributions and mathematical properties of failure-rate functions. Prerequisite: Stat 191, 192; or equivalent. (Fall)

291 **Problems in Operations Research** (3)

Field experience in operations research on a team basis. Each small group locates an actual problem and formulates solution by operations research models. Class evaluation of progress. (Spring)

298 **Research** (arr.)

Basic or applied research in operations research. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)
(Fall and spring)

351 **Advanced Topics in Mathematical Programming** (3)
Special topics, including geometric programming, branch and bound methods, max-min problems, pseudo-Boolean programming, calculus of variations, optimal control, and large-scale programming. Prerequisite: OR 252 or permission of instructor. (Fall 1973 and alternate falls)

361 **Games, Decisions, and Value Theory** (3)
General structure of statistical games: concepts of utility and optimal strategies, the invariance principle, sequential decision processes, Bayes procedures in games. Principles of value theory: measurement of relative values, metagames, and the dominance principle. Prerequisite: OR 261, Stat 192; or permission of instructor. (Spring 1975 and alternate springs)

377 **Advanced Stochastic Models in Operations Research** (3)
Selected applied probability models, including Brownian motion, renewal theory, denumerable Markov chains, semi-Markov processes, and Markov decision problems. Applications to topics in advanced queuing and inventory theories, including busy periods, waiting times, imbedded Markov chains, and GI/G/1 queues; and conditions for optimality of (s, S) policies, stochastic leadtime problems, state-dependent leadtimes, and multi-echelon problems. Prerequisite: OR 277, 279; or permission of instructor. (Fall 1974 and alternate falls)

381 **Reliability Theory II** (3)
Nonparametric methods in reliability: increasing failure rate (IFR) and decreasing failure rate (DFR) characterizations of failure distributions, tests for IFR, DFR, and "U-shaped" distributions. Coherent structures: classes of distributions preserved under coherent structures, bounds on system reliability using modular decomposition. Drenick's theorem, preservation of monotone failure rates. Replacement: comparison of random age, and block replacement policies. Repairman problems. Redundancy optimization and allocation of redundancy. Prerequisite: Stat 192 and permission of instructor. (Spring 1974 and alternate springs)

396 **Seminar: Operations Research** (arr.)
May be repeated for credit. (Fall or spring)

397 **Advanced Topics in Operations Research** (3)
Advanced topics from the literature of operations research for analysis, presentation, and discussion. Reading assignments from the professional journals selected by the instructor and the student. May be repeated for credit. (Fall or spring)

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

Required Courses in Engineering Undergraduate Curricula Offered by Columbian College of Arts and Sciences

For convenience, descriptions of required courses in undergraduate curricula which are offered by Columbian College of Arts and Sciences are listed here. See the *Undergraduate and Graduate Catalogue* for elective courses in the humanities and social sciences.

CHEMISTRY

13 General Chemistry (4)

Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Atomic structure, chemical bonding; chemical equations; acids and bases; chemical equilibrium; liquid and solid states; periodicity; electrochemistry; organic chemistry. Prerequisite: Math 31, Phys 2. Laboratory fee, $21. (Fall)

ENGLISH

***1 English Composition: Language as Communication** (3)

Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence, by analysis of selected current books; library research procedure. (Fall and spring)

***1*x* English Composition: Language as Communication** (3)

Intensive course in English grammar and composition for students inadequately prepared for Engl 1. Begins with detailed instruction, drill, and exercises in basic structure of the English language and in writing paragraphs; continues with content of Engl 1. Engl 1*x* meets five hours a week and carries 3 semester hours of credit. Total fee, $289 (tuition fee of $264 plus additional fee of $25). (Fall and spring)

GEOLOGY

136 Engineering Geology (3)

Geological principles and processes and their application to civil and mechanical engineering. Prerequisite: Math 31, Phys 2; or permission of instructor. (Spring)

MATHEMATICS

30 Precalculus (3)

Set theory, inequalities, basic analytic geometry, functions and relations. Polynomial, trigonometric, logarithmic, and exponential functions. Prerequisite: Math 3 and 6; or one and one-half years of high school algebra, one year of high school geometry, and one-half year of high school trigonometry; or equivalent. Prior to registration, new students should take a placement examination in algebra and trigonometry. (Fall and spring)

* Students whose College Board English Composition Achievement Test scores suggest inadequate preparation may be assigned to Engl 1*x* or may be tested in vocabulary, spelling, grammar, standard usage, and writing skill, before placement in either Engl 1*x* or 1. Students whose scores and/or writing skill indicate superior competence will be allowed to waive the Engl 1 requirement.

31 Calculus of One Variable (3)

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30* or equivalent. (Fall and spring)

32 Calculus of Several Variables (3)

Partial derivatives, multiple integrals, infinite series. Prerequisite: Math 31. (Fall and spring)

PHYSICS

1 General Physics (4)

Topics in classical physics which form a foundation for modern physics. Prerequisite: two years of college preparatory mathematics or concurrent registration for Math 6. Laboratory fee, $11. (Fall and spring)

2 Introduction to Modern Physics (4)

Selected topics in modern physics, including relativity and quantum theory. Prerequisite: Phys 1 or equivalent. Laboratory fee, $11. (Fall and spring)

31–32 Introduction to Theoretical Physics (2–2)

Theoretical structure of physics, emphasis on appropriate analytical techniques. Prerequisite: two semesters of calculus and Phys 2. (Academic year)

51–52 Introduction to Experimental Physics (2–2)

Experiments and lectures on the basic phenomena of physics and techniques of experimentation. Prerequisite: Phys 2 and two semesters of calculus. Laboratory fee, $11 a semester. (Academic year)

SOCIOLOGY

126 Urban Sociology (3)

Place of the city in larger society; growth of the city, problems of urban living, group life, personality, urban housing, city planning, and suburban development. (Fall and spring)

* Math 30 may be waived as a prerequisite by examination on scheduled dates.

GENERAL INFORMATION

Registration

THE DATES, HOURS, AND PLACE OF REGISTRATION will be stated in the *Schedule of Classes*, which is available well in advance of each semester.

A student cannot register for classes until he has received a letter of admission to the University issued by the appropriate admitting office.

No registration is accepted for less than a semester or one summer session.

A student may not register concurrently in this University and another institution without the prior permission of the dean of the college, school, or division in which he is registered in this University. Registration in more than one college, school, or division of the University requires the written permission of the deans concerned, *prior to registration*. Allowance of credit for work done concurrently at another institution is at the discretion of the appropriate committee.

ELIGIBILITY FOR REGISTRATION

Registration for the following categories of campus students is held on the days of registration stated in the University Calendar. A student who is suspended or whose record is not clear for any reason is not eligible to register.

New Student.—Upon receipt of a letter of admission, the new student is eligible for registration on the stated days of registration.

Readmitted Student.—A student previously registered in the University who was not registered for campus courses during the preceding semester or summer session must apply for and receive a letter of readmission from the appropriate admitting office before he is eligible for registration. A student registered for the spring semester of 1973 need not apply for readmission for the fall semester 1973. Such a student is a "Continuing Student."

Continuing Student.—The student registered for campus courses in the immediately preceding semester of the academic year is eligible to register upon presentation of his student identification card from the previous semester. The student registered for the 1973 Summer Sessions campus courses, and not restricted to summer registration, is eligible to register for the 1973 fall semester on presentation of his 1973 Summer Sessions student identification card.

REGISTRATION CHANGES AND WITHDRAWALS (see pages 140–41, 147)

Fees and Financial Regulations

FEES PAID BY STUDENTS cover only a portion of the cost of the operation of the University. Income from endowment funds, grants, and gifts from alumni and friends of the institution make up the difference.

The following fees and financial regulations were adopted for the 1973 Summer Sessions and the academic year 1973–74. (See pages 138–39 for projected tuition and fee increases for 1974–77.)

Tuition Fees

For undergraduate study:

Full-time program (12 or more hours a semester) $1,200.00

Part-time program, for each semester hour 88.00

For graduate study* (except for those students registered before July 1, 1967, who wish to continue payments in accordance with the plan (see below) in effect prior to that date):

For each semester hour for which the student registers 88.00

Doctoral students not enrolled under the payment plan in effect before July 1, 1967, are required to register for minimum hour-loads,† as follows:

1. Full-time doctoral students must register for a minimum of 12 semester hours a semester until 24 hours of work have been completed beyond the qualifying examination; and a minimum of 4 semester hours a semester thereafter until the satisfactory completion of the final examination.
2. Part-time doctoral students must register for a minimum of 6 semester hours a semester until 24 hours of work have been completed beyond the qualifying examination; and for a minimum of 4 semester hours a semester thereafter until the satisfactory completion of the final examination.

For candidates for Master's degrees registered prior to July 1, 1967, who wish to continue payments according to the plan in effect prior to that date:

Total fee, including the Master's Comprehensive Examinations‡ 2,400.00

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* Registration in thesis courses (299–300) entitles the student, during such registration to the advice of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished an additional semester will be granted, requiring payment of a "continuous registration" fee (see page 138). If the preparation of the thesis extends beyond the three-semester period, approval for this extension will be required and the student must repeat the thesis course 300 and pay tuition as for a repeated course, provided the over-all time limit for earning the degree is not exceeded.

† No minimum hour-load is required during the summer sessions.

‡ Students completing payment of the total fee before completion of the required work (including thesis and comprehensive examinations) will be granted registration on a "continuous registration—no charge" basis for one semester immediately following the semester in which tuition payment is completed.

Students requiring additional time for completion of required work after completion of payment of the total fee and the expiration of a semester "continuous registration—no charge" must register each semester and pay the normal "continuous registration" fee. See page 149 for regulation governing Military Leave.

For students registered for the degree of Doctor of Science prior to July 1, 1967, who wish to continue payments according to the plan in effect prior to that date:

For work leading to and including the qualifying examination*..... $2,350.00
For work leading to and including the final examination*..... 2,350.00

University Center Fee (charged all students registered on campus,† nonrefundable)

For students registered for 11 or more semester hours on campus:
Each semester 37.50

For students registered for less than 11 semester hours in a semester on campus:
For each semester hour for which the student registers..... 3.50

For students maintaining "continuous registration" status:
Each semester 3.50

Additional Course Fees

In certain courses additional fees, such as laboratory and material fees, are charged. These fees are charged by the semester and, unless otherwise indicated, may be defrayed in two payments when the tuition is paid in this manner. Breakage of apparatus is charged against the individual student. When breakage is in excess of the normal amount provided for in the laboratory fee the individual student will be required to pay such additional charges as are determined by the department concerned.

Graduation Fees

Bachelor's, Master's, Doctor's degrees..... $25.00

Fee for Binding Master's Thesis..... 10.00

Fee for Microfilm Service and Printing Announcement of Final Examination for the Doctoral Degree..... 60.00

Residence Hall Fees (see page 155).

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* If the tuition for the first stage is paid in full at the beginning of the first stage of the doctoral discipline, the candidate is entitled to five successive semesters on a "continuous registration—no charge" basis. If still more time is needed, the student must maintain continuous registration and pay the continuous registration fee.
If the tuition is paid in four installments at the rate of $587.50 a semester at the beginning of the first stage of the doctoral discipline, no continuous registration fee will be charged if a third year is needed for completion of the first stage of the degree requirements. If still more time is needed, the student must maintain continuous registration and pay the continuous registration fee.
If the tuition is paid in six installments at the rate of $391.66 a semester and if still more time is needed, the student must maintain continuous registration and pay the continuous registration fee.
If the tuition for the second stage is paid in full at the beginning of the second stage of the doctoral discipline, the candidate is entitled to three successive semesters on a "continuous registration —no charge" basis. If still more time is needed, the student must maintain continuous registration and pay the continuous registration fee.
If the tuition is paid in two installments at the rate of $1,175.00 a semester at the beginning of the second stage of the doctoral discipline, no continuous registration fee will be charged if a second year is needed for completion of this stage of the discipline. If the tuition is paid in four installments at the rate of $587.50 a semester at the beginning of the second stage and still more time is needed, the student must maintain continuous registration and pay the continuous registration fee.

† Students in off-campus programs are charged the University Center Fee only when registered for courses on campus.

Special Fees

Application fee (undergraduate degree candidates), nonrefundable	$10.00
Application fee (graduate degree candidates), nonrefundable	25.00
Tuition deposit, nonrefundable, charged each entering or readmitted full-time undergraduate student	100.00
Application for room reservation, nonrefundable, charged each resident student	100.00
Admission tests (when required)	6.00–12.00
Late-registration fee, for failure to register within the designated period	15.00
Late payment fee, charged for failure to make payments when due (see "Payment of Fees," pages 139–40)	15.00
Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," pages 139–40)	35.00
Returned check fee, charged a student whose check is returned because of insufficient funds or improper drafting	15.00
Continuous registration fee, to maintain "continuous registration" status during any semester of absence from the University or after completion of tuition requirements*—due and payable on the official days of registration	88.00
Engineers' Council fee, charged each student in the School of Engineering and Applied Science for each semester or any part thereof except the summer term	5.00
Special Columbian College of Arts and Sciences departmental examination for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both	25.00
For each examination to qualify for advanced standing and for each special examination	5.00 5.00
English test for foreign students (when required)	3.00
Laboratory checkout fee, for failure to check out of chemistry laboratory by the date deadline set by the instructor†	2.00
Transcript fee, for each transcript of record	

Registration for on-campus courses in the University entitles each student to the following University privileges: (1) the services of the Student and Alumni Career Services Office; (2) the use of the University Library; (3) gymnasium privileges; (4) admission to all athletic contests, unless otherwise specified; (5) subscription to the *University Hatchet*, the student newspaper; (6) admission to University debates; (7) medical attention as described under Student Health Service. These privileges terminate when the student withdraws or is dismissed from the University.

PROJECTED TUITION AND FEE INCREASES 1974–77

In order that students and their parents may plan more realistically for a total four-year period, tuition increases for the academic years 1974–75, 1975–76, and 1976–77 have been estimated as follows:

Increase by year (full-time undergraduate students):	$100.00
1974–75	

* Payment of the continuous registration fee entitles the student to return and continue his work toward a degree under the academic requirements which were in force at the time of his first registration. The continuous registration fee applies toward neither tuition fee nor residence requirements for the degree. (See also footnotes on pages 136 and 137.)

See page 149 for regulation governing Military Leave.

† A student who drops a chemistry course before the end of the semester must check out of the laboratory at the next regular laboratory period.

1975–76	$100.00
1976–77	100.00

* Increase by semester hour (graduate and part-time undergraduate students):

1974–75	4.00
1975–76	4.00
1976–77	4.00

The University Center fee will be increased for the 1974 Summer Sessions and the academic year 1974–75. For students taking 11 or more semester hours, the fee will be $43.00 a semester, an increase of $5.50. Students taking less than 11 semester hours will pay $4.00 a semester hour, an increase of $.50.

Every effort will be made to keep tuition increases within the above limits. However, it is not possible to project future economic data with certainty, and circumstances may require an adjustment in these estimates.

PAYMENT OF FEES

No student is permitted to complete registration or attend classes until all charges are paid. Tuition and fees for each semester are due and payable in full at the Office of the Cashier at the time of each registration. Checks and postal money orders should be made out to George Washington University.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. A student registered for six semester hours or more may sign a deferred payment contract with the Student Accounts Office at the time of each registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 31, 1973 (for the fall semester), and March 6, 1974 (for the spring semester). Interest at the rate of eight per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made. The University will not obligate itself to notify the student, in advance, of the payment-due date for the second half of the semester charges.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $525 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of eight per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his right to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settle-

* Semester-hour increases become effective at the beginning of the summer sessions preceding the academic year.

ment will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registered for credit.

Because many parents may wish some option in meeting and financing all or part of the cost of a college education, the University offers educational loan plans through the Girard Bank in Philadelphia, Pennsylvania; Funds for Education, Inc., Manchester, New Hampshire; and The Riggs National Bank, Washington, D.C.

Although similar in purpose, these plans vary somewhat in coverage and conditions. One-year and multiple-year plans are available. Insurance covering the life and health of the sponsor is provided through these plans.

Individuals over twenty-one years of age who are employed full-time are also eligible to apply. They may sponsor their own contracts, provided they meet the conditions specified by the plan for which they are applying.

Brochures and applications describing these plans are available in the Office of Student Financial Aid.

WITHDRAWALS AND REFUNDS*

Applications for withdrawal from the University or for change in class schedule must be made in person or in writing to the Dean of the School. Notification to an instructor is not an acceptable notice (see "Withdrawal," page 146).

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges and fees will be made in accordance with the following schedule for the fall and spring semesters.

1. *Complete withdrawal* from the University:

Fall Semester	
Withdrawal dated on or before September 14, 1973	90 per cent
Withdrawal dated September 17 to September 28, 1973	75 per cent
Withdrawal dated October 1 to October 12, 1973	50 per cent
Withdrawal dated after October 12, 1973	none
Spring Semester	
Withdrawal dated on or before January 18, 1974	90 per cent
Withdrawal dated January 21 to February 1, 1974	75 per cent
Withdrawal dated February 4 to February 15, 1974	50 per cent
Withdrawal dated after February 15, 1974	none

2. For a *change in status from full-time to part-time student* or for *partial withdrawal* by a *part-time student*, the above schedule applies to the difference in charges between the original program and the adjusted program continuing in effect.
3. A student enrolled in an undergraduate full-time program who drops or adds a course and continues to be in a full-time program will have no financial adjustments of tuition made other than those involving course fees.
4. A student who is granted military leave before completing the semester will receive credits for current charges in accordance with the schedule for

* Regulations concerning withdrawals and refunds for the Summer Sessions are stated in the *Summer Sessions Catalogue*.

complete withdrawal from the University (see No. 1, page 140). Payments made in excess of the nonrefundable balance will be refunded to the student. The nonrefundable balance will be maintained as a deferred credit for use by the student when he returns to the University (see "Military Leave," page 149).

5. Regulations governing student withdrawals as they relate to residence hall and food service charges are contained in the specific lease arrangements.

In no case will tuition be refunded or reduced because of absence from classes.

Payment applies only to the semester for which a registration charge is incurred, and in no case will this be credited to another semester.

Authorization to withdraw and certification for work done will not be given a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can make banking arrangements in the community.

Financial Aid*

FOR UNDERGRADUATE STUDY

THE GEORGE WASHINGTON UNIVERSITY has a program of financial assistance for undergraduate students in the form of scholarships, loans, grants, part-time employment, or any combination of these resources. The University participates in the National Direct Student Loan, Supplemental Educational Opportunity Grant, and College Work-Study programs. Financial aid is awarded on the basis of the student's scholastic record, financial need, and qualities of leadership and character.

Applications and supporting credentials for financial aid must be filed by February 1 (entering freshmen), March 1 (enrolled undergraduate or entering transfer students) preceding the academic year of the award for the fall semester; by November 1, for the spring semester; and by May 1, for the summer sessions†.

Credentials required of all financial aid applicants:

1. *Application for Financial Aid* forms for entering freshmen and transfer students are attached to the Application for Admission. Students presently enrolled in the University may obtain forms upon request, at the Office of Student Financial Aid.

2. *Parents' Confidential Statement* (Code 5246) must be filed by all applicants who are dependent on parental support. Students desiring consideration for independent status will be provided additional forms upon receipt of the application.

3. A photostatic copy of latest federal income tax return (IRS Form 1040 or 1040A) must accompany the application. Dependent students should provide their parents' return, independent students their own.

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* For information concerning financial aid for students from foreign countries, see page 144.

† A Summer Sessions student is eligible for consideration only if he is enrolled in this University for at least 8 semester hours in the immediately preceding spring semester or has applied for financial aid for the following fall semester.

SCHOLARSHIPS AND GRANTS

Scholarships are awarded for the academic year unless otherwise specified and are credited in equal parts for each semester. Each holder must carry a full schedule of academic work during the period for which the scholarship is awarded.

The following scholarships are limited to students in the School of Engineering and Applied Science. The University offers many others which are open to engineering students. A special bulletin containing a complete list and full information concerning fellowships, scholarships, and grants may be obtained from the Office of Student Financial Aid, George Washington University, Washington, D.C. 20006.

Frederick Albert and Alma Hand Britten Scholarships (1959).—Bequest of Alma Hand Britten for scholarship assistance to students entering the School of Engineering and Applied Science who would not otherwise be able to pursue such professional study. Available for undergraduate and graduate study.

Henry Harding Carter Scholarship (1896).—Established by Maria M. Carter in memory of her husband to aid a deserving student who is preparing for the civil engineering profession. Available to students working toward the degree of Bachelor of Science (Civil Engineering).

Henry Parsons Erwin Scholarship (1955).—Established by Helen B. Erwin as a memorial to her husband, a former Trustee of the University. A partial scholarship for a student in Engineering and Applied Science.

Louis E. Giles Memorial Scholarships (1966).—Bequest of Susie E. Giles in honor and memory of her husband for scholarships to undergraduate and graduate students in the School of Engineering and Applied Science requiring financial assistance.

George Washington University Board of Trustees Scholarships.—Full- and partial-tuition undergraduate scholarships which will begin in the fall semester and extend for four successive academic years, provided the holder maintains a *B* average, as well as a high standard of deportment, and continues to be in financial need. Candidates must plan to select a curriculum leading to a Bachelor's degree.

FOR GRADUATE STUDY

SCHOLARSHIPS, FELLOWSHIPS, ASSISTANTSHIPS

The George Washington University program of financial assistance for graduate students includes graduate scholarships, fellowships, assistantships, and loans. Application for admission to graduate study is a prerequisite for consideration. The University participates in the National Direct Student Loan and College Work-Study programs.

Application and correspondence concerning graduate scholarships, fellowships, or assistantships, unless otherwise specified, should be sent directly to the Dean of the School, and addressed to George Washington University, Washington, D.C. 20006. Unless otherwise specified, application and supporting credentials should be submitted not later than March 1 preceding the period for which the award is made.

A separate application for National Direct Student Loans or the College Work-Study Program must be submitted to the Office of Student Financial Aid by April 1 for the following academic year.

Frederick Albert and Alma Hand Britten Scholarships (1959).—See page 142.

Paul H. and Margaret M. deMaine Scholarships (1967).—Full and partial scholarships for graduate students whose research involves the use of computers. Inquiries should be made to the Director of the Computer Center of the University.

Louis E. Giles Memorial Scholarships (1966).—See page 142.

Phi Delta Gamma Scholarship Endowment Fund (1968).—Established by the Beta Chapter of Phi Delta Gamma, national fraternity for graduate women. For graduate women students.

Graduate Teaching Fellowships.—Available to students in Master's and doctoral programs. Each teaching fellow renders a designated unit of service to his major department of instruction and receives a stipend of up to $2,800 (on a 9-month basis), plus tuition and course fees.

National Science Foundation Graduate Fellowships.—Fellowships leading to graduate degrees in the mathematical, physical, medical, biological, engineering, and social sciences, and in the history and philosophy of science; providing tuition, fees, and stipends. Open to students who have been admitted to graduate status and who have completed less than one calendar year of graduate study. Applications should be made to the Fellowship Office, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

Research Assistantships in Operations Research and Related Fields.—Available to graduates, and to undergraduates on the junior and senior levels, in any school of the University. Research Assistants are expected to work 20 hours a week conducting research in support of an established research program, in programming or in conducting individual research on an approved research project. Stipends vary from approximately $3,300 to $6,800, depending on the status of the student and the tenure of the appointment (9–12 months). Further information and applications are available from the Director, Institute for Management Science and Engineering, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20006.

Research Scholar Assistantships, GWU—NASA-Langley Program.—See pages 34–35.

Resident Assistantships (men and women).—Available to graduate students and seniors in any field of study who are interested in working with the student personnel program in University residence halls. Specific duties vary with the position, but basically consist of counseling, advising student groups, and administration. Remuneration includes full tuition and a furnished room for the academic year. All positions are part-time, enabling staff members to enroll as full-time students. Further information may be obtained from the Office of the Dean of Students.

LOAN FUNDS

Several loan funds are available to students in the University in accordance with the qualifications placed thereon by the donors. Two loan programs limited to students in the School of Engineering and Applied Science are available. Students should direct inquiries to and file applications with the Office of Student Financial Aid.

Warren Stickler Memorial Loan Fund (1966).—A fund established by the Precision Measurements Association as a memorial to Warren Stickler is available to engineering students.

John Brewster Willis, Jr., Loan Fund in Mechanical Engineering.—Established by Mrs. William L. Lane as a memorial to her nephew, John Brewster Willis, Jr., available to Mechanical Engineering students (graduate or undergraduate) who are primarily interested in aeronautics.

A number of short-term emergency loan funds are also available at the University. Information concerning these funds is contained in a special bulletin available from the Office of Student Financial Aid.

COLLEGE WORK-STUDY PROGRAM

The Federal College Work-Study Program provides part-time jobs both on and off campus for full-time students with financial need. Applications and information are available at the Office of Student Financial Aid.

STUDENT EMPLOYMENT

The Student and Alumni Career Services Office maintains a registry of both full-time and part-time positions available in the Washington area for undergraduate and graduate students.

After registration, interested students may apply at the Student and Alumni Career Services Office, 2033 G Street, N.W., for interviews and referrals to positions for which they are qualified.

FOREIGN STUDENTS

Undergraduate foreign students with proven financial need who have completed one semester of full-time work (15 hours) at this University with a *B* average (3.00) or better are eligible to apply for University Board of Trustees Scholarships. Scholarships are awarded in the spring for the following academic year. See instructions for applying for undergraduate financial aid, page 141.

Limited awards for graduate teaching fellowships are the responsibility of the chairman of the department or dean of the school in which the degree is to be earned. Work as a teaching fellow requires excellent knowledge of English—both spoken and written.

Long-term loan funds for undergraduate and graduate foreign students are limited in amount and are available only to those foreign-born persons who have established resident status in the United States through the Immigration and Naturalization Service.

Students who wish to study in the United States should have available sufficient funds to cover expenses for one full year before attempting to enter a college or university. The cost at this University for one academic year (September–May) is approximately $5,000. This estimate includes room and board, tuition, books, clothes, and incidental expenses; no travel, holiday, or medical expenses are included.

Prizes

Norman B. Ames Memorial Award.—Established by many friends of Professor Ames and awarded annually to a graduating senior of the School of En-

gineering and Applied Science who is nominated by his fellow students as having made significant contributions to the students in the School of Engineering and Applied Science and to the School and University.

Martin Mahler Prize in Materials Testing.—A one-year membership in the American Society for Testing Materials awarded to the upper division or graduate student in engineering who submits the best reports on tests in the materials laboratories course with preference given to prestressed concrete tests.

School of Engineering and Applied Science Distinguished Scholar.—A certificate awarded annually by the Faculty of the School of Engineering and Applied Science to the senior who graduates with the highest scholastic standing. The student's name is engraved on a plaque displayed in Tompkins Hall of Engineering.

Sigma Tau Prize.—A medal awarded annually by Xi Chapter to the freshman in the School of Engineering and Applied Science who maintains the highest scholastic standing in the work of the entire year.

Theta Tau Activities Plaque.—A plaque awarded annually by Gamma Beta Chapter to the senior in the School of Engineering and Applied Science with the most outstanding record in activities for the entire period of his attendance.

Regulations

A STUDENT ENROLLED in the School of Engineering and Applied Science is required to conform to the following regulations.

A student who withdraws or is suspended, or is otherwise absent from the University for one semester or more, may re-enter and continue his work only under the rules and regulations in force at the time of his return.

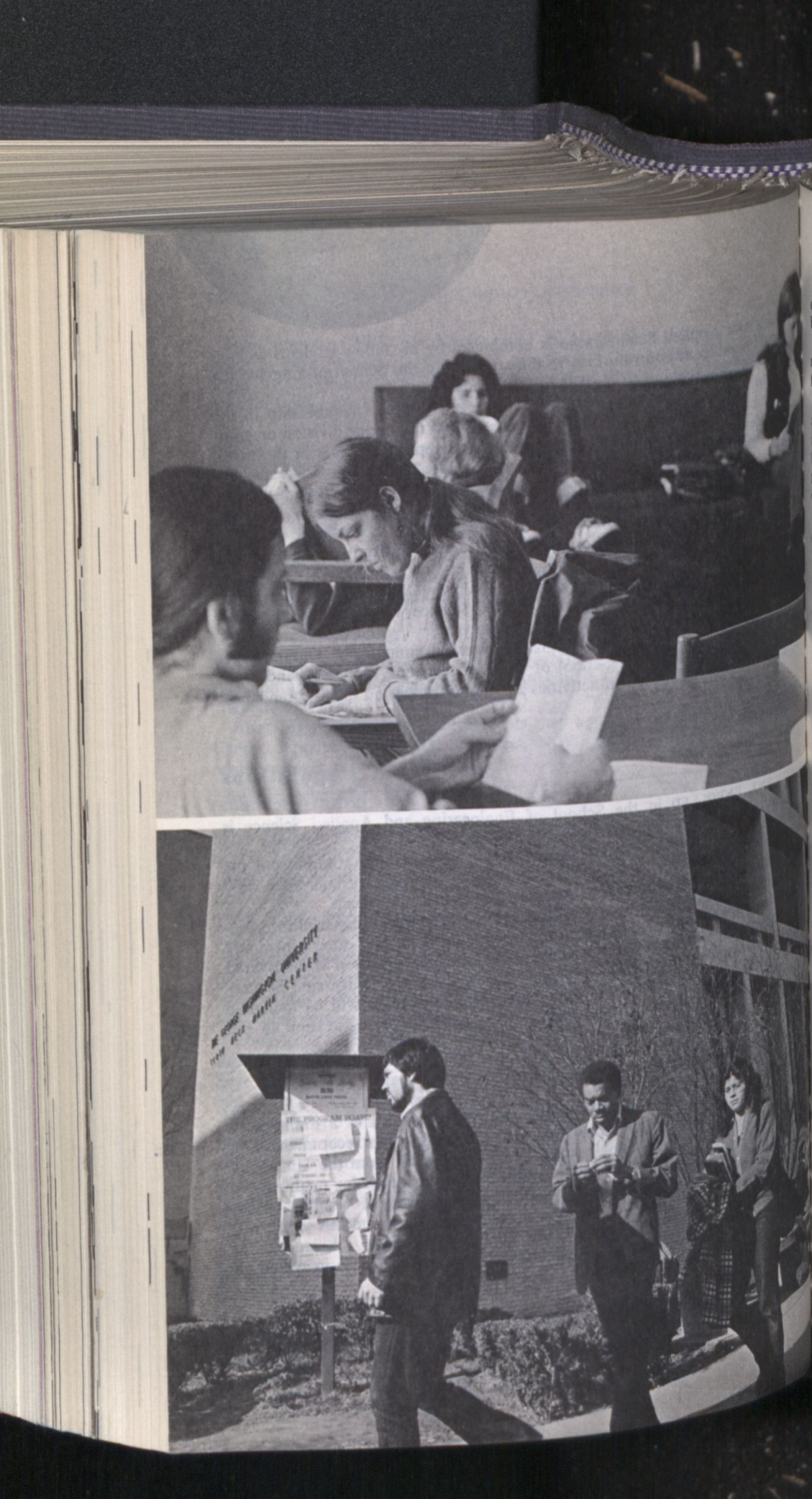
If a student knowingly makes a false statement or conceals material information on an application for admission, registration card, or any other University document, his registration may be canceled. If such falsification is discovered after the student has established an academic record at the University, he may be subject to dismissal from the University. Such a student will be ineligible (except by special action of the Faculty) for subsequent registration in the University.

ACADEMIC DISHONESTY

Academic dishonesty on the part of any student will result in a disciplinary grade of *F* for the course involved and also may, upon the recommendation of the appropriate dean's council, result in his suspension from the University for a stated period, at the end of which time he may petition for readmission. Upon approval of the Dean's Council, the disciplinary grade of "Failure—Academic Dishonesty" will be recorded for the course involved, and this grade will be employed in the computation of the quality-point index. A student so suspended shall be withdrawn from all other courses except those in which all work has been completed.

CHANGES IN PROGRAM OF STUDIES

A student may not make any changes in his approved program of studies with-



ut the approval of the Dean. Requests for change in class registration must e made on a form provided in the School Office.

During the seven days following the first day of classes of a semester, courses ay be added to the student's program with the approval of the instructor, the aculty adviser, and the Dean.

Courses may be dropped by undergraduate students without academic penalty only during the fourteen days following the first day of classes, with the approval of the instructor, the student's adviser, and the Dean. Courses may e dropped by graduate students without academic penalty only within the first our weeks of a semester, with the approval of the instructor, the faculty adviser, and the Dean.

ITHDRAWAL

A student who withdraws or is otherwise absent from the University for one emester or more must apply for readmission. If readmitted, he continues his ork under the requirements and regulations in force at the time of his readmission.

Applications for withdrawal from the University or for change in class schedle must be made in person or in writing to the Dean of the School. Notification to an instructor is not an acceptable notice.

Withdrawal from a course or from the University, *without academic or financial penalty*, requires the permission of the Dean of the School. Permission to ithdraw from the University will not be granted to a student who does not ave a clear financial record.

Withdrawal from any course without academic penalty after the fourteenth day following the first day of classes of a semester may be granted by the Dean to undergraduate students only under the following conditions: (1) exceptional circumstances make the request necessary; (2) the request is submitted on the official form for late withdrawal; (3) as of the date of request, the grades in all courses involved are *C* or better. In exceptional circumstances the Dean may authorize withdrawal for graduate students without academic penalty after the first four weeks of a semester. In all cases financial regulations governing withdrawal remain in full effect.

All charges for courses dropped without the approval of the Dean must be met by the student. Reporting the dropping of a course to an instructor does not effect its discontinuance.

CREDIT

Credit toward a degree is given only after registration for and satisfactory completion of the required work of a course or upon the granting of advanced standing. A student who takes a course as an auditor may not take the same course later for credit.

On request the Registrar will issue to undergraduate degree candidates a balance sheet showing the amount of work completed and the requirements remaining to be met for the degree.

TRANSCRIPTS OF RECORD

Official transcripts of student records are issued by the Registrar on request

of the student or former student who has a clear financial record. A fee of two dollars is charged for each transcript.

SUMMER SCHOOL CREDIT

A student who plans to attend summer school at another institution and apply credit so earned toward graduation from this University must first secure the written approval of the Dean. In no event will credit in excess of what might be earned in a similar period in this University be recognized.

CONTINUOUS REGISTRATION

Degree candidates are expected to maintain continuous registration until all degree requirements are satisfied. Students who have completed course registration (including the thesis) maintain continuous registration by paying the "continuous registration" fee (see page 139). By failing to register for one semester or more, the student breaks his registration and must be readmitted. The procedure for readmission to the graduate programs is the same as that for undergraduates (see pages 16–17). A "Readmitted Student" is required to satisfy the academic requirements existing at the time of his readmission.

Students must be registered during the summer if they are taking courses, are taking required examinations, are receiving guidance on theses or dissertations, or are expecting to graduate at the end of the Summer Sessions.

GRADUATION REQUIREMENTS

To be recommended by the Faculty for graduation a student must have met the admission requirements of the School; completed satisfactorily the scholarship, curriculum, residence, and other requirements for the degree for which he is registered; and be free from all indebtedness to the University. Registration, either for course work or on the "continuous registration" fee basis, is required for the semester or summer session immediately preceding the awarding of the degree.

Application for Graduation.—An "Application for Graduation" form must be filed and the appropriate fee paid at the time of registration for the last semester or summer session of the senior or final year.

Students completing degree requirements during the Summer Sessions will be awarded diplomas (no formal convocation) September 30, *provided* they have completed all degree requirements and have applied for graduation as a part of registration for the Summer Sessions.

Attendance and Conduct.—The University reserves the right to refuse to confer a degree upon a candidate whose attendance or conduct has been unsatisfactory.

THE LIBRARY

All students registered in the University have the privilege of using the University Library. Its stacks are open, and all students are welcome to browse at their leisure. The Student Identification Card, issued upon the payment of fees, must be presented when books are borrowed for outside use.

The loan period for most books available for outside circulation is 30 days. A fine of 25 cents is charged for each day a book is overdue. Any book which

circulates is subject to recall by the Library if needed for reserve or other use. Reserve books must be used in the reserve reading room when the Library is open, except that they may be withdrawn for overnight use beginning at 8:30 p.m. A fine of 50 cents is charged for each hour or fraction thereof that a reserve book is overdue. Grades of a student are withheld until his library record is clear.

All students using the University Library are expected to be familiar with its detailed regulations, available at any of the Library's service desks.

MILITARY LEAVE

A student called to active duty may be granted military leave for the period of active duty, upon presentation to his Dean of a copy of his orders and a petition for such leave. The maintenance of "continuous registration" is not required of the student on military leave; however, he must apply for readmission to the University well in advance of the semester in which he expects to return. Payments for tuition and fees which are not refunded to the student at the time he is granted military leave will be maintained as a deferred credit for his account and use upon his return to the University.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

In general, the policy of the University is one of attempting to keep the student's record confidential and out of the hands of those who would use it for other than legitimate reasons. At the same time, the policy must be flexible enough not to hinder the student, the University, or the community in their legitimate endeavors.

No information concerning a student will be released except as noted below:

1. Information such as whether or not the student is currently enrolled; dates of attendance; verification of date and place of birth; degrees earned (if any), date, major field or area of concentration, and honors received; home and local addresses and telephone numbers; school, college, or division of enrollment, and class; verification of signature; name and address of parent or guardian.

2. The issuance of formal transcripts of record to recognized institutions of higher learning; the certification of academic achievement to the various recognized professional associations (law, medicine, engineering, education, etc.). Additional information will be released only on written authorization from the student, or by court order or subpoena. If a subpoena is served, the student whose record is being subpoenaed will be notified and the subpoena will be referred to the University's legal counsel.

Government investigative agencies have no inherent right to access to student files and records. If expressly requested, properly identified representatives from federal, state, or local government agencies may be given the information listed under No. 1 above.

UNIVERSITY POLICY ON SELECTIVE SERVICE INFORMATION

The University notifies draft boards of a student's academic status only when the student requests or authorizes, in writing, that the draft board be notified. An undergraduate student desiring certification for the Selective Service System must go to the Registrar's Office and complete the Selective Service Informa-

tion Card which authorizes the University to notify his draft board of his full-time enrollment. It is the student's obligation to complete this card if he wants his draft board to know that he is registered as a full-time student. This card contains the following statement:

> By my signature below, I hereby authorize the University to notify my draft board of my academic status in the University, or of any changes in academic status that occur during this semester.

RIGHT TO DISMISS STUDENTS

The right is reserved by the University to dismiss or exclude any student from the University, or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

PROPERTY RESPONSIBILITY

The University is not responsible for the loss of personal property. A "Lost and Found" Office is located on campus in the Safety and Security Office.

RECENTLY ESTABLISHED REGULATIONS

An Appendix (pages 179–81) contains regulations recently approved by the University's Board of Trustees.

Consortium of Universities of the Washington Metropolitan Area, Inc.

THE UNIVERSITIES IN WASHINGTON, D.C.—American University, Catholic University of America, *George Washington University*, Georgetown University, and Howard University—are associated in a Consortium through which they coordinate the use of their respective facilities; District of Columbia Teachers College, Gallaudet College, and Trinity College are associate members of the Consortium. Students in approved programs leading to degrees in any one of these institutions have the opportunity to select from the combined offerings of all the particular courses which best meet their needs.

Participation is limited to campus degree candidates. The following, however, are excluded: students in Canon Law, Dentistry, Medicine, and Theology. Law students are also excluded from participation, except for candidates for

he degree of Master of Laws at George Washington University and George-own University.

In special courses involving private instruction (as in music or art) or tutorial tudy, if a special fee is charged, this fee is not covered by the Consortium greement and must be paid by the individual student to the institution adminis-ring the course. A student interested in registering for Reserve Officer Train-g Corps (ROTC) courses should consult the Registrar at his institution.

Students interested in taking courses at an institution other than their own hould consult the program announcements of the other institutions. Con-rtium application forms and instructions are available from the Registrar fter the student has obtained his registration packet. In order to participate the Consortium program (1) the graduate student must obtain the approval his adviser and should ascertain from the department of the institution where e course is taught whether or not he is eligible for the course and whether ere is a space in the class, *or* (2) the undergraduate student must obtain the pproval of his adviser and *must* ascertain from the department of the institu-on where the course is taught whether or not he is eligible for the course and hether there is space in the class. Specific inquiries should be addressed to e Registrar. *A student may not take courses at another institution that are ailable at his own.* The student registers and pays at his own institution for l Consortium courses.

University Computer Center

HE UNIVERSITY COMPUTER CENTER is located on the first floor of Stuart Hall, 013 G Street, N.W. The facilities of the Center are available for academic urposes to all registered students and to members of the instructional staff. he Center has as its principal mission the provision of a powerful computing ystem which serves the University in its educational, research, and administra-ve endeavors. The Center's programming staff concentrates its efforts in con-ducting faculty and staff seminars, consulting with users in the design and prep-ration of complicated programs, and carrying out computer-oriented research.

The Computer Center equipment consists of an IBM system 370 Model 145 omputer with large capacity on-line disk storage, a card read/punch, a high-peed line printer, and four tape drives. The principal languages available to he user are FORTRAN IV, COBOL, Programming Language One (PL/I), ssembler Language, and ALGOL. In addition, numerous utility, statistical, data manipulation, and simulation systems and special languages are available n the library of programs. Facilities are available on a first-come, first-served asis for preparation of programs and data.

Computer programming courses are offered by the School of Government nd Business Administration, the Department of Statistics, and the School of ngineering and Applied Science. In addition, many other departments offer ourses that utilize the computer as a research adjunct to course work.

The Computer Center is normally open 24 hours a day.

The Speech and Hearing Clinic

THE SPEECH AND HEARING CLINIC offers diagnostic and remedial work for children and adults with such communication difficulties as stuttering, lisping, cleft palate speech, and cerebral-palsied speech; and with voice, articulatory, and hearing problems. Diagnostic and remedial work is also available for persons with nonstandard language usage due to such conditions as hearing loss, brain damage, mental retardation, and environmental factors.

Fees.—The fee for an initial evaluation is $20. Fees for additional specialized testing are dependent on the testing involved. The fees for individual speech or hearing therapy range from $3 to $10 a session. Fees are reduced for full-time students enrolled in the University and for persons receiving group therapy. Fees are payable at the Office of the Cashier.

The Reading Center

THE READING CENTER offers individual diagnostic and corrective services for all levels: primary, elementary, secondary, and adult. In addition, special reading improvement classes are conducted for high school and college students as well as other adults.

A complete diagnosis includes psychological tests; vision, hearing, dominance, and spelling tests; and various types of reading achievement and aptitude tests. Results are interpreted, and a written report is presented in conference with the parents or the individual.

The special reading improvement classes for high school students, college students, and other adults are offered throughout the year at stated intervals. Emphasis is placed on improvement of vocabulary, speed, comprehension, and study skills. Instruction in spelling is also provided as needed. Mechanical aids such as the tachistoscope, rate accelerator, and controlled reader are available for increasing speed of comprehension.

Fees.—The fee for individual diagnosis is $90; for individual instruction, $10 a lesson; for semi-individual instruction, $7 a lesson; for instruction in small groups, secondary level, $6 a lesson. Reading classes (15 two-hour sessions) are offered for adults, $140; for full-time George Washington University students and faculty, $65. All fees are payable in advance at the Office of the Cashier.

Veterans Education

THE OFFICE OF THE REGISTRAR assists students entitled to educational benefits as veterans or war orphans with any problems which may arise concerning their benefits. This Office also processes certification of enrollment and attendance to the Veterans Administration so that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or war orphans should consult the Office of the Registrar prior to submitting application to the Veterans Administration. All such students should obtain the instruction sheet issued

the Office of the Registrar, which sets forth requirements to be fulfilled
fore certification of enrollment can be made to the Veterans Administration,
d which includes other information of general interest.
The Veterans Administration is at 2033 M Street, N.W., Washington, D.C.
421.

Alumni Associations

HE GENERAL ALUMNI ASSOCIATION

HE OBJECTIVES OF THIS ASSOCIATION are to unite the graduates who wish to
ociate themselves for charitable, educational, literary, and scientific purposes,
d to promote the general welfare of the University.
Eligible members are those who have matriculated in any school of the Uni-
rsity and who have left the University in good standing, or any person who
or has been a member of the teaching, research, or administrative staff of the
niversity, or of the Board of Trustees of the University. Active members are
ose who are life members of The George Washington University General
lumni Association or the Alumni Association of any school of the University,
are current contributors to the George Washington University Fund.
All alumni are urged to keep the Alumni Office informed of changes of ad-
ess or occupation and to supply information with regard to their fellow
lumni.

HE ENGINEER ALUMNI ASSOCIATION OF THE GEORGE WASHINGTON NIVERSITY, INC.

The Engineer Alumni Association was organized in 1936 and incorporated in
963 to coordinate with the General Alumni Association those activities of
rimary interest to the engineering alumnus. The objectives of the Association
e to provide the link between the graduates and Faculty of the School, to
elp promote the general welfare of the School of Engineering and Applied
ience and of the University, to foster activities of the engineering organiza-
ons recognized by the University, and to advance the engineering profession
general.

In 1966 a board of directors, comprised of fifteen elected members of the
Association and the Engineers' representatives serving on the Governing
Board of the General Alumni Association, was established. The membership
of the board of directors was expanded in 1969 to include the Director of
Alumni Relations and one representative each from the Faculty of the School
and the student body. Five members of the Association are elected each year,
prior to the June meeting, to three-year board memberships as listed below:

Term Expiring 1973
Dulany F. deButts III
Matthew Flato
William H. Holt
James A. Sinsabaugh
H. Moffette Tharpe, Jr.

Term Expiring 1974
John A. LeReche
Raymond P. Morales
Laurence J. O'Callaghan
Arthur E. Proctor
Joseph Widman

Term Expiring 1975
Thomas Chappelle
John R. Manning
Richard Pronk
Elmer W. Whitlock

General Alumni Association Representatives
William H. Holt
John R. Manning
Edward A. Wareham III

Director of Alumni Relations
Ellwood A. Smith

Faculty Representative
Nozer D. Singpurwalla

Student Representative
Mark Rothenberg

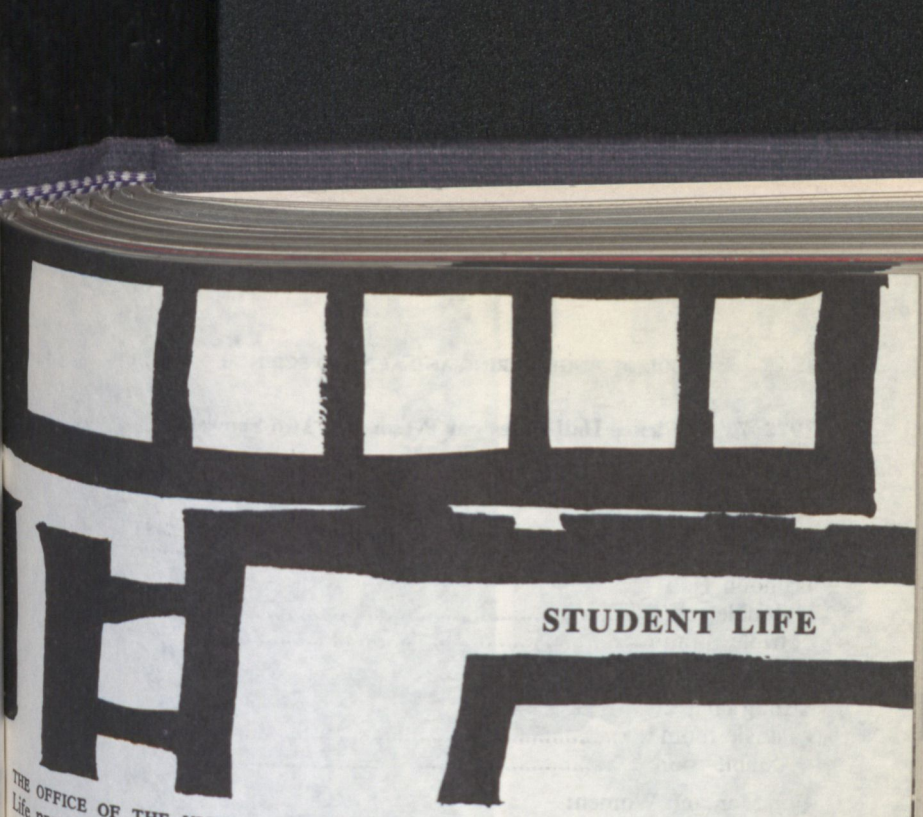
At the June meeting each year the board elects officers for its operation duri
the upcoming year. The officers for the years 1972–73 are

President.—William H. Holt, B.S. in Engr. 1957, LL.B. 1961; 4300 23
Road N., Arlington, Va. 22207

Vice President.—John R. Manning, B.S. in Engr. 1957, J.D. 1961; 2774
Wakefield Street, Arlington, Va. 22207

Secretary.—Laurence J. O'Callaghan, B.S. (E.E.) 1967; 7704 Nimitz Dri
District Heights, Md. 20028

Treasurer.—Dulany F. deButts III, B.C.E. 1962; 9907 Commonwealth Boul
vard, Fairfax, Va. 22030



STUDENT LIFE

THE OFFICE OF THE VICE PRESIDENT FOR STUDENT AFFAIRS develops Student Life programs, policies, and procedures to complement the University's formal instruction program. These activities are implemented through the offices of the Cloyd Heck Marvin Center, Counseling Center, Dean of Students, Educational Opportunity Program, Housing, International Students, Student Activities, Student and Alumni Career Services, and Student Health Service.

STUDENT SERVICES

OFFICE OF THE DEAN OF STUDENTS

The Office of the Dean of Students provides counseling and information to the general student body, and assists in program development on campus, particularly in the residence halls. Since the members of the staff of this Office are well informed on University policies and all student services provided on campus, they are able to provide referrals or answers to questions. The Dean of Students works with the Adviser to International Students, the Director of the Counseling Center, the Director of the Educational Opportunity Program, and the Director of Housing in the implementation of their programs.

HOUSING

Complete information concerning the University's residence halls is available from the Director of Housing, George Washington University, Washington, D.C. 20006. Information concerning off-campus housing near the University may be obtained at this Office. The reservation of rooms in private houses must be made by students.

Admission to the University does not include a room reservation. The student will receive, with his notification of acceptance, University residence hall information, an application for residence hall space, a medical examination form, and a declaration of intent to attend the University. The medical examination form must be completed by the applicant and his physician and returned to the Student Health Service Office. The application for residence hall space must be accompanied by a $100 *nonrefundable deposit*. The housing deposit is credited toward the first semester's room charge. Rooms are leased for the academic year, and lease payment must be made by July 15 for the fall semester.

1973–74 Residence Hall Rates per Person for Two Semesters*

For Men:	
Adams Hall	
double room	$800
triple room	750
Calhoun Hall	
double room	825
triple room	775
For Women:	
Strong Hall	
single room	875
double room	825
For Men and Women:	
Crawford Hall—double room	775
Mitchell Hall—single room	875
Thurston Hall	
double room, triple room, large room for four	825
suite for six	775
Graduate Men and Women Only:	
Graduate Hall—apartment for three	875
Madison Hall—double room	825

FOOD SERVICE

Resident freshmen and sophomores are required to participate in the food service plan. Freshmen must participate in the seven-day, 20 meals per week plan, at the rate of $700* for the academic year. Sophomores may elect either the 20-meal plan or a five-day meal plan, 15 meals Monday through Friday, for $660* for the academic year. Either plan is optional for junior, senior, and graduate students. Food service payment does not cover University intersession or vacation periods. All meal cards admit bearer to the dining room in Thurston Hall and the second floor contract dining room in the Cloyd Heck Marvin Center.

MUNSON HALL APARTMENTS

Munson Hall is a University-owned and operated apartment house containing 15 one-bedroom and 54 efficiency apartments. Graduate and married students are given priority for residence until July 15 each year. Seniors and juniors who have lived at least one year in University residence halls will be considered for residency after that date if space is available. All leases are for 12 months.

EDUCATIONAL OPPORTUNITY PROGRAM

The Educational Opportunity Program is designed to offer a college education primarily to black and other minority students who are graduates of District of Columbia high schools and/or other qualified District residents. It provides an opportunity for a student to seek a degree in almost any field and at the same time receive academic and/or financial assistance.

* Residence Hall and food service prices subject to change.

CLOYD HECK MARVIN CENTER

The Cloyd Heck Marvin Center serves as the campus community center, providing services, conveniences, and recreational and social opportunities for students, faculty, staff, alumni, and guests. Its wide range of facilities provides the setting for a variety of programs conducted by the University Program Board; the departments of Drama, Dance, and Music; and other student and faculty organizations.

A two-board structure, representative of all elements of the University community, plays an important role in the day-to-day functioning of the Center. The Governing Board and the Operations Board work closely with the full-time staff in the development of procedures and policies which provide a framework for the Center's operation.

STUDENT HEALTH SERVICE

The Student Health Service is a general outpatient clinic designed to assist students registered on campus with their health needs. This Service is located at 935 22nd Street, N.W. (in the H.B. Burns Memorial Building).

Physicians are present during the academic year from 9 a.m. to 5 p.m. and from 6 p.m. to 10 p.m., Monday through Friday, and from 9 a.m. to 12 noon on Saturday. This schedule is also maintained during the Summer Sessions, except that the evening closing hour Monday through Friday is 9 p.m.

During hours when the Student Health Service is closed, on-campus students may contact consulting physicians for advice connected with illness or emergency by calling 223-2200 (the Medical Bureau). All callers should always identify themselves as George Washington University students and ask for the physician-on-call. For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. This arrangement is for emergency care only, and all fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receive treatment at the Student Health Service. A student who is not currently enrolled or who has severed his connection with the University is ineligible for medical benefits of the Student Health Service. Any student may engage, if he so desires, physicians and nurses of his own choice, but he will be responsible for all the fees charged. The bills incurred from all services rendered outside of the Student Health Service (for example, laboratory and X-ray work and referrals to specialists or other outside physicians) are the responsibility of the student. Within the Student Health Service, there will be only a few small charges for some services, such as materials for an allergy injection series, overseas immunizations, and certain other services.

A student intending to train for an athletic team is required to pass a medical examination. The University is not responsible for injuries received in intercollegiate or intramural games, or in any of the activities of the Department of Physical Education, Health, and Recreation.

HEALTH AND ACCIDENT INSURANCE

The Student Health Service Office has arranged for Health and Accident Insurance, on an elective basis, for *full-time students* registered on campus. Interested students should consult the Student Health Service Office.

COUNSELING CENTER

The Center offers to students enrolled in the University services which are designed to assist individuals in the diagnosis and treatment of their educational, personal, and social problems; to diagnose problems leading to academic difficulties; to offer vocational counseling and programmed instruction; and to refer individuals to qualified agencies for assistance with problems not handled by the Center. Behavior therapy, individual and group psychotherapy, and individual and group counseling are available.

The Center also provides special assessments including diagnostic measures prescribed by the School of Engineering and Applied Science, admissions tests for the University and for other selected educational institutions, and some selected assessments for business and industry.

Fees.—Students who are currently registered as degree candidates in the University are entitled to one interview free of charge. If the student decides to continue to use the services offered, a minimum flat fee of $30 will be charged for short-term treatment. Fees for testing an long-term treatment depend upon the services involved. All fees are payable at the Counseling Center Office.

INTERNATIONAL STUDENTS

International House is the campus center for students from foreign countries. It serves also as the headquarters of the International Students' Society which seeks to promote international friendship and understanding by welcoming to its membership students from all countries, including those from the United States.

The Adviser to International Students has his Office in International House and is available each day throughout the school week for consultation on immigration regulations and on any matters concerning the social and academic welfare of the foreign student.

STUDENT AND ALUMNI CAREER SERVICES OFFICE

The Student and Alumni Career Services Office provides assistance to degree-seeking students and alumni seeking full-time, part-time, temporary, or permanent employment. All students are urged to become acquainted with the services of this Office early in their college experience.

Counseling concerning trends in employment, areas of employment, various civil service and examination announcements, preparation for job interviews, resume-writing, and other procedures for successful job application are always available. Specific career openings; an on-campus recruitment program by business, industry, government, and school systems; volunteer opportunities; and part-time and temporary jobs for students while attending school are all part of this service. Referral and placement functions of the on-campus College Work-Study program are handled by the Student and Alumni Career Services Office. Teacher credential files initiated by persons seeking employment in all educational fields are maintained in this Office.

An understanding and knowledgeable approach to avenues of service for those people who do not find career satisfaction in structured systems of business, government, and education is also provided in the Student and Alumni Career Services Office.

RELIGIOUS LIFE

The University recognizes the contribution that religion makes to the life of its students and encourages them to participate in the various religious organizations of their own choice. Catholic, Jewish, and Protestant bodies sponsor various groups and form a link between the University and the religious community. The advisers of the religious organizations are available for counseling.

Religious services in various traditions are provided regularly for the University community as announced.

DAVIS-HODGKINS HOUSE

The Davis-Hodgkins House is the student center of the School of Engineering and Applied Science, providing lounges, reading rooms, and student organization offices. The House provides convenient, comfortable facilities for the exchange of ideas and good fellowship.

STUDENT ACTIVITIES

The offices of the Vice President for Student Affairs, the Dean of Students, the Director of the Cloyd Heck Marvin Center, and the Director of Student Activities are responsible for all co-curricular phases of student life.

STUDENT ACTIVITIES OFFICE

The Student Activities Office assists individual students and organizations in program development, campus leadership training, and participation in special projects—both within the University community and in the community at large. This Office also serves as a central clearinghouse for development and maintenance of a master activities calendar—for registering and assisting campus organizations, for scheduling facilities (except in the Marvin Center) and events, and for informing the University community of the many activities and programs which can enrich the educational experience through a variety of weekly, monthly, and annual publications. The Student Activities Office is also responsible for coordinating a comprehensive orientation program for new students entering the University. Students interested in participating in the many social, cultural, or extracurricular phases of University life should acquaint themselves with the facilities and functions of the Student Activities Office and its staff.

UNIVERSITY COMMITTEES AND ORGANIZATIONS

The George Washington University is an active, working community where student involvement has become a motivating force in the governance of the University through the committee structure. This involvement has helped develop policies and programs beneficial not only to the student population, but to the total University community. While serving on these committees, student members are able to participate in the formulation and the application of ongoing institutional policy.

There are numerous committees on which members of the student body are able to serve. The Student Activities Office has a relatively complete file on major committees, and interested students should inquire there for further in-

formation. Additional information is also contained in the *Student Handbook*. A brief description of some of these committees follows:

Joint Committee of Faculty and Students.—This administrative committee, created in response to a resolution of the Faculty Senate, is composed of seven faculty members, seven student members, and other ex officio members. Members of this Committee are appointed by the President.

The Committee is officially charged to "facilitate all efforts to improve student-faculty relations," to "encourage student recommendations in all areas of Senate policy-formulation which affect student life," and to "recommend changes in the 'Rules and Regulations Governing the Conduct of Student Life.'" The Committee has specific advisory powers in many areas concerning student-faculty relations and the interests of the student body.

Committee on the Judicial System.—The Committee on the Judicial System is composed of three faculty members and three student members, one of whom is the Chairman of the Student Court, one a student member of the Student-Faculty Committee on Appeals, and one selected from the campus at large. The Committee on the Judicial System works closely with the Executive Secretary to the Judicial System to make sure that the various hearing bodies are efficiently, fairly, and expeditiously conducting their business.

Other committees include the following: the Committee on University Parking, the Committee on Religious Life, the Committee on Sponsored Research, the Committee on Student Publications, and the Committee on the University Bookstore.

THE STUDENT NOMINATING BOARD

This all-student board was created by the President upon the recommendation of the Joint Committee of Faculty and Students in February, 1971. The Board was established "to make appointments to all University Committees that have student members where there is no other existing means by or through organizational charter or constitution to do so."

The members of the Student Nominating Board are the President of Mortar Board; the President of Omicron Delta Kappa; a student member of the Graduate School of Arts and Sciences Advisory Council; and one representative from each of the following: Residence Hall Association, Engineers' Council, Joint Committee of Faculty and Students, Student Bar Association, and Association of Medical Students.

THE PROGRAM BOARD

The University Program Board, through its student committee structure and membership, provides a variety of cultural, social, and recreational programs on campus. As a result, students are afforded opportunities to broaden their educational experiences by developing and participating in those programs which contribute to the life of the University community.

Student membership on the Program Board is composed of four executive officers (Chairman, Vice Chairman, Secretary, Treasurer) elected from the general student body in the spring semester, and five committee chairmen appointed after that election. The five committees of the Program Board are the Public Relations Committee, Concert Committee, Arts Coordinating Committee, Political Affairs Committee, and Social Committee. These students work

with appointed faculty members and professional staff from the Division of Student Affairs in carrying out their many programs and activities.

THE ENGINEERS' COUNCIL

The Engineers' Council is the student governing body for the School of Engineering and Applied Science, composed of elected representatives from each level class and from the graduate student body, from each student organization in the School, the Business Manager of the *Mechelecіv*, and the House Manager of the Davis-Hodgkins House. The purpose of the Council is to provide liaison between the student body of the School and the Faculty, Administration, and Student Government of the University in all matters affecting the general interests and welfare of the student body, the School, or the University. The Council is maintained financially by the Engineers' Council fee paid by each student in the School, and sponsors the engineers' student magazine, *Mechelecіv;* the Engineers' Mixers; and the Engineers' Ball. Council meetings are open to all students in the School.

The Council acts as the directing body for *Mechelecіv*, which is free to all students in the School. This magazine includes campus and alumni news, a calendar of events, news of the student organizations, and articles on engineering by students and faculty members. The magazine is published by a student Board of Editors and a volunteer student staff.

STUDENT ORGANIZATIONS

The following is a representative list of organizations active at the University during 1972–73 of particular interest to students in the School of Engineering and Applied Science. More complete information on these and other organizations is available at the Student Activities Office.

HONOR SOCIETIES

Sigma Xi.—A national scientific honor society, the purpose of which is to encourage original investigation in science, pure and applied. Outstanding graduate students in the sciences are eligible for full membership, and undergraduates who have shown marked ability in research may be elected to associate membership.

Delphi.—An intersorority honorary society.

Delta Sigma Rho-Tau Kappa Alpha.—A national forensic society.

Mortar Board.—A national society for senior college women, stressing leadership, scholarship, and service.

Omicron Delta Kappa.—A national fraternity for junior and senior men emphasizing leadership in extracurricular activities.

Phi Eta Sigma.—A national fraternity, established to encourage and reward high scholarship and attainment, membership in which is limited to those freshman men who attain a scholastic average of at least 3.50 or the equivalent.

Sigma Tau.—A national engineering honorary fraternity, the purpose of which is to recognize scholarship and professional attainment.

Tau Beta Pi.—A national engineering honorary fraternity, the purpose of which is to recognize distinguished scholarship and exemplary character.

INTERNATIONAL AND CULTURAL EXCHANGE ORGANIZATIONS

Caravansary International, Indian Cultural Association, International Students' Society, Korean Students Association, Organization of Arab Students, Students International Meditation Society, Wah Geo Club.

PERFORMING ARTS

Art Coordinating Committee of the Program Board; Cherry Pie Film Festival; Concert Committee of the Program Board; George Washington University Dance Company; University Chamber Choir, Chorus, Orchestra; Metatheatre Project; University Players. A variety of programs is presented by these groups throughout the academic year.

POLITICAL ORGANIZATIONS

GW College Young Republicans, GW Young Democrats, GWU Ripon Society, Political Affairs Committee of the Program Board, Young Americans for Freedom, Young Socialist Alliance.

PROFESSIONAL ORGANIZATIONS

American Society of Civil Engineers (Student Chapter).
American Society of Mechanical Engineers (Student Chapter).
Institute of Electrical and Electronic Engineers (Student Chapter).
Theta Tau (Gamma Beta Chapter).—A national professional (engineering) fraternity. Membership by invitation to outstanding students who have completed successfully at least the first year in the School of Engineering and Applied Science.

PUBLICATIONS AND COMMUNICATIONS

Academic Forum (student-faculty journal), *The Cherry Tree* (the yearbook), *The University Hatchet* (semi-weekly newspaper), *Mecheleciv* (engineers' publication), *Potomac Review* (publication of Consortium graduate students), *The Rock Creek* (literary magazine), *Student Directory, This Month* (monthly listing of major cultural events in the Washington area), *This Week* (weekly list of scheduled events), *Where to Go Guide* (shops, stores, and services in the campus area), WRGW (University radio station).

RELIGIOUS ORGANIZATIONS

Baptist Student Union, B'nai B'rith Hillel Foundation, Christian Science Organization, Eastern Orthodox Club, Lutheran Student Association, Newman Foundation, Nichiren Sho Shu Study Academy, Religious Society of Friends, Satsang, Unitarian-Universalist Club, United Christian Fellowship, Wesley Foundation.

SERVICE ORGANIZATIONS

Circle K, Ecology Action, Freedom Shore Experience, GW Day Care Committee, GW Medical Aid, Project Share, RAP-ID RESCUE, St. Elizabeths Hospital Project, SERVE, Student Volunteer Action Council.

SOCIAL FRATERNITIES

Delta Tau Delta, Kappa Sigma, Phi Sigma Delta, Sigma Alpha Epsilon, Sigma Chi, Sigma Nu, Sigma Phi Epsilon, Tau Kappa Epsilon.

SOCIAL SORORITIES

Delta Gamma, Kappa Alpha Theta, Kappa Kappa Gamma. A Panhellenic Council consists of representatives of all sororities at the University.

SPECIAL INTEREST AND ADVOCATE GROUPS

Black Engineering Society, Black People's Union, Campus Association for Principled Education, Commission on Model Government, D.C. Public Interest Research Group, Freedom Leadership Foundation, Gay People's Alliance, GW Alpha-Theta Club, GW Labor Committee, Jewish Activist Front, Open Committee for an All-University Government; People's Union, Scientists and Engineers for Political Action, Student/Faculty Union for an Open University, Student Mobilization Committee to End the War, Women's Liberation.

SPORTS, HOBBIES, RECREATIONAL ORGANIZATIONS

Ananda Marga Yoga Society, Bridge Club, Cheerleaders, Folk Dance, GW Amateur Radio Club, GWU Grotto, GWU Parachute Club, GWU Rugby Club, GWU Chapter of Yoga Institute of Washington, Ski Club.

ATHLETICS

The University is a member of the National Collegiate Athletic Association and the Eastern College Athletic Conference. Its teams participate against the major universities throughout the Midwest and eastern seaboard. The intercollegiate program is comprised of basketball, baseball, soccer, tennis, golf, wrestling, rifle, crew, and cross country.

The University offers a broad program of intramural sports activities for both men and women through the Department of Physical Education, Health, and Recreation.

MAJOR PROGRAM EVENTS

Art Exhibits.—The work of locally, nationally, and internationally known artists is shown in monthly exhibits in the Dimock Gallery in Lisner Lounge and in the art gallery of the Cloyd Heck Marvin Center. With the cooperation of the Curator of Art, an annual student art exhibit is presented.

Concert Series.—The Department of Music presents an artist concert series of five concerts each year.

Orchestra and Concert Series.—The University Orchestra and Chorus are two facets of the lively arts available to students either as credit courses or as extracurricular activities. The Chorus presents major performances to the University community four or five times a year, including regular Christmas and Spring concerts. The University Orchestra presents four or five concerts a year.

Program Board Series.—The University Program Board sponsors concerts each semester at which nationally known entertainers perform.

Recreation Program.—The University Recreation Association and the Department of Physical Education, Health, and Recreation arrange a wide variety of sports and recreational activities and special events for all students.

Theatre.—The Drama Department produces seven major plays during the year on the new proscenium/thrust stage in the Dorothy Betts Marvin Theatre or in Lisner Auditorium. Several original and experimental plays are produced in the Experimental Theatre. Students have the opportunity to participate in all aspects of theatre and may receive credit toward their B.A. or M.F.A. degrees for some of their production work.

THE UNIVERSITY

HISTORY AND ORGANIZATION

THE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington whose name it bears is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the Federal City. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended "a fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "that persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets and extending north from Florida Avenue to somewhat beyond Columbia Road. The Medical School was located downtown. For the better part of the Columbian University period, the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. Within a few blocks are the White House, the Department of the Interior, the State Department, the World Bank, and many other government offices and international agencies. The area is not without its reminders of historic interest to the University. President Monroe, who signed the Charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for fifty years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he hoped to see established.

The University as it is now organized consists of Columbian College of Arts and Sciences (undergraduate); the Graduate School of Arts and Sciences; the professional schools, which include the National Law Center and the schools of Medicine, Engineering and Applied Science, Education, Government and Business Administration, and Public and International Affairs; the College of General Studies; the Division of University Students; and the Summer Sessions.

The George Washington University is privately endowed and is governed by a self-perpetuating Board of Trustees of which the president is an ex officio member.

THE UNIVERSITY LIBRARIES

The Library collections of the University are housed in the University Library, the general library of the University, and in the departmental libraries of law and medicine.

These collections contain over 565,000 volumes—about 395,000 in the University Library, about 121,000 in the Law Library, and about 50,000 in the Medical Library. Approximately 30,000 volumes a year are added to the Library's resources. Endowments, supplementing the University appropriation, provide books in the fields of American civilization, American literature, foreign service, history, public finance, and the social sciences; and gifts from many sources have enriched the collections. The Libraries currently receive 5,500 periodicals.

Information concerning the use of the Libraries may be obtained at the Library service desks.

The Library is administered for the curricular, reference, and recreational needs and interests of the students. Instruction in the use of the library is given upon request by the reference librarians. The Library endeavors to assist students and all members of the University to use the rich library resources of Washington and the unusual opportunities they offer for extensive research. Interlibrary loan arrangements are maintained with other libraries in the city and throughout the United States.

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APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subject to change in connection with the establishment of judicial processes. Bulletins and handbooks incorporating any changes will be issued as appropriate.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on October 19, 1968:

Whereas, safety and order are essential preconditions of the learning process, and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection of free speech and freedom of assembly, and to safeguarding the right of lawful protest on campus; and is committed equally to maintaining the peace and safety of the campus, in the knowledge that all rights are in jeopardy when violence and civil disorder prevail over law and reason;

Now, therefore, be it resolved by the Senate of The George Washington University: that in the event a demonstration at this University exceeds the bounds of free assembly and lawful advocacy, and demonstrators are engaging in unlawful acts which cause or imminently threaten injury to persons or property, or which obstruct or interfere with normal and necessary University activities, this body affirms the authority of the President, or other University officials designated to act in his absence, to take such reasonable steps, if possible after consultation with the Chairman of the Executive Committee of the University Senate* and the President of the Student Body, as are required to restore and preserve order; including, if deemed necessary and appropriate, suspension of students or faculty engaging in such acts, and use of such law enforcement personnel as are needed to effect the removal, arrest, and prosecution of law violators. Any such suspension shall be reviewed by an appropriate tribunal as soon after order is restored as is practicably possible.

The following was approved by the University's Board of Trustees on October 19, 1968:

Any student suspended from The George Washington University on the grounds of exceeding the bounds of free assembly and lawful advocacy shall have his suspension reviewed by the Hearing Committee on Student Affairs† of The George Washington University as soon after order is restored as is practicably possible.

* The University Senate has been renamed the Faculty Senate.

† The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968:

The George Washington University is opposed to discrimination based on race, color, or creed. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the Faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

(a) who engages in conduct that unreasonably obstructs teaching, research, and learning, or

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

(c) who disobeys general regulations of the University, or
(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established within the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*

* The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

ANNUAL ISSUES OF THE UNIVERSITY BULLETIN

Requests for the following publications must include your zip code and should be addressed as indicated.

COLLEGE OF GENERAL STUDIES, Dean of the College

NATIONAL LAW CENTER, Dean of the Center

SCHOOL OF ENGINEERING AND APPLIED SCIENCE, Dean of the School

UNDERGRADUATE AND GRADUATE CATALOGUE (Arts and Sciences, Education, Government and Business Administration, Public and International Affairs), Office of Admissions

SCHOOL OF MEDICINE, Admissions Office, School of Medicine

SUMMER SESSIONS CATALOGUE, Dean of the Summer Sessions

SCHEDULE OF CLASSES: FALL AND SPRING SEMESTERS, Registrar

SCHEDULE OF CLASSES: SUMMER SESSIONS, Dean of the Summer Sessions

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COLLEGES AND SCHOOLS—DEGREE PROGRAMS

COLUMBIAN COLLEGE OF ARTS AND SCIENCES: Associate in Arts (A.A.), Associate in Arts in General Studies (A.A. in Gen.Std.), Bachelor of Arts (B.A.), Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bachelor of Science in Environmental Health (B.S. in Env.Health), Bachelor of Science in Geodetic and Cartographic Science (B.S. in Geod. and Cart.Sc.), Bachelor of Science in Medical Technology (B.S. in Med.Tech.), and Bachelor of Science in Oceanography (B.S. in Ocea.)

GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master of Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.), Master of Music (Mus.M), Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers), Master of Science in Forensic Science (M.S. in Forens.S.), Master of Science in Special Studies (M.S. in Sp.Std.), and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE: Associate in Science (A.S.), Bachelor of Science in Allied Health Science (B.S. in A.H.S.), and Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master of Comparative Law (M.Comp.L.), Master of Comparative Law (American Practice) (M.Comp.L.(Am.Prac.)), and Doctor of Juridical Science (S.J.D.)

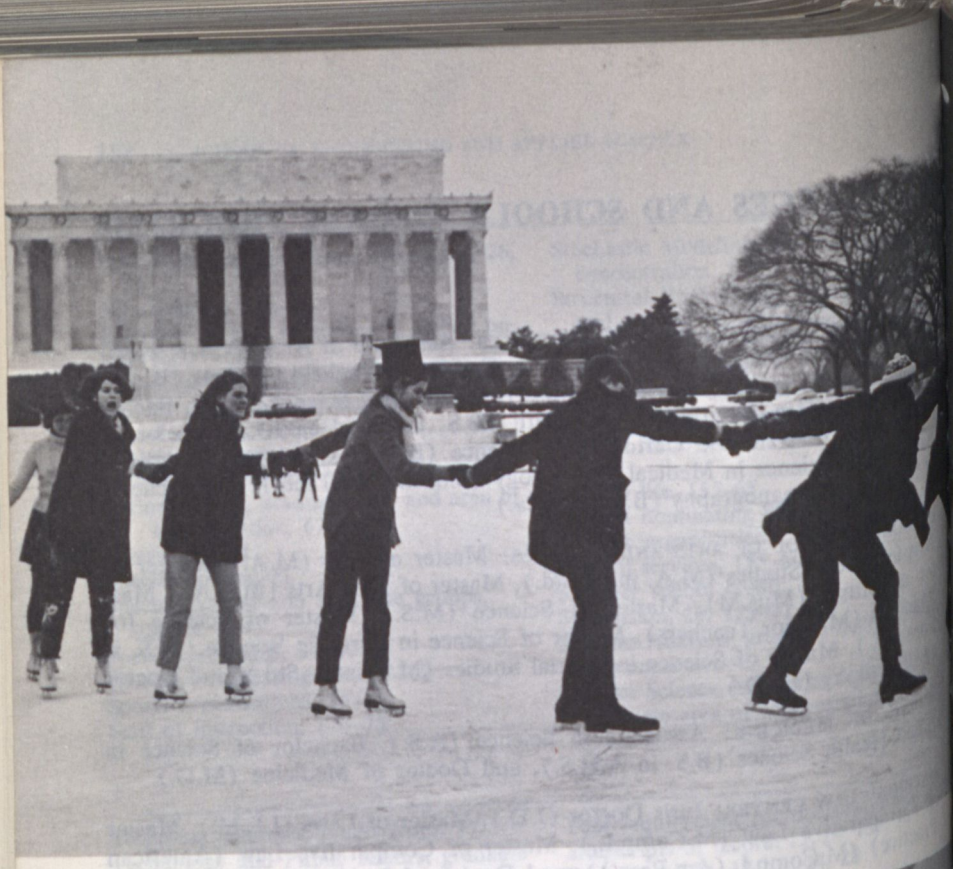
SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil Engineering) (B.S. (C.E.)), Bachelor of Science (Electrical Engineering) (B.S. (E.E.)), Bachelor of Science (Mechanical Engineering) (B.S. (M.E.)), Master of Engineering Administration (M.E.A.), Master of Science (M.S.), and Doctor of Science (D.Sc.)

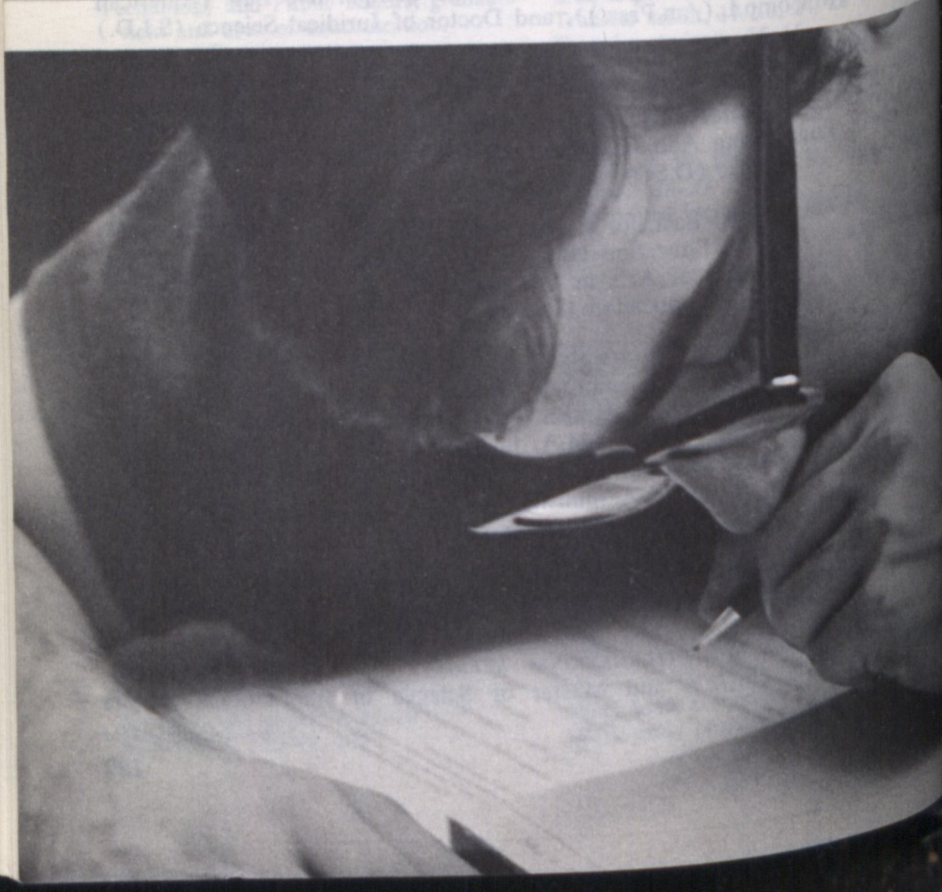
SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed.), Bachelor of Science in Physical Education (B.S. in P.E.), Master of Arts in Education (M.A. in Ed.), Master of Arts in Teaching (M.A.T.), Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Business Administration (B.B.A), Bachelor of Science in Administration (B.S. in Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.), Master of Arts in Government (M.A. in Govt.), Master of Arts in Health Care Administration (M.A. in H.C.A.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), Master of Science in Administration (M.S. in Adm.), Master of Urban and Regional Planning (M. of Urb and Reg.Plan.), Post-Master's Graduate Certificate in Health Care Administration (Grad.Cert. in H.C.A.), Doctor of Business Administration (D.B.A.), and Doctor of Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.), Master of Arts (M.A.), and Master of Science in International Affairs (M.S. in I.A.)

5/73—Cornelius—25M



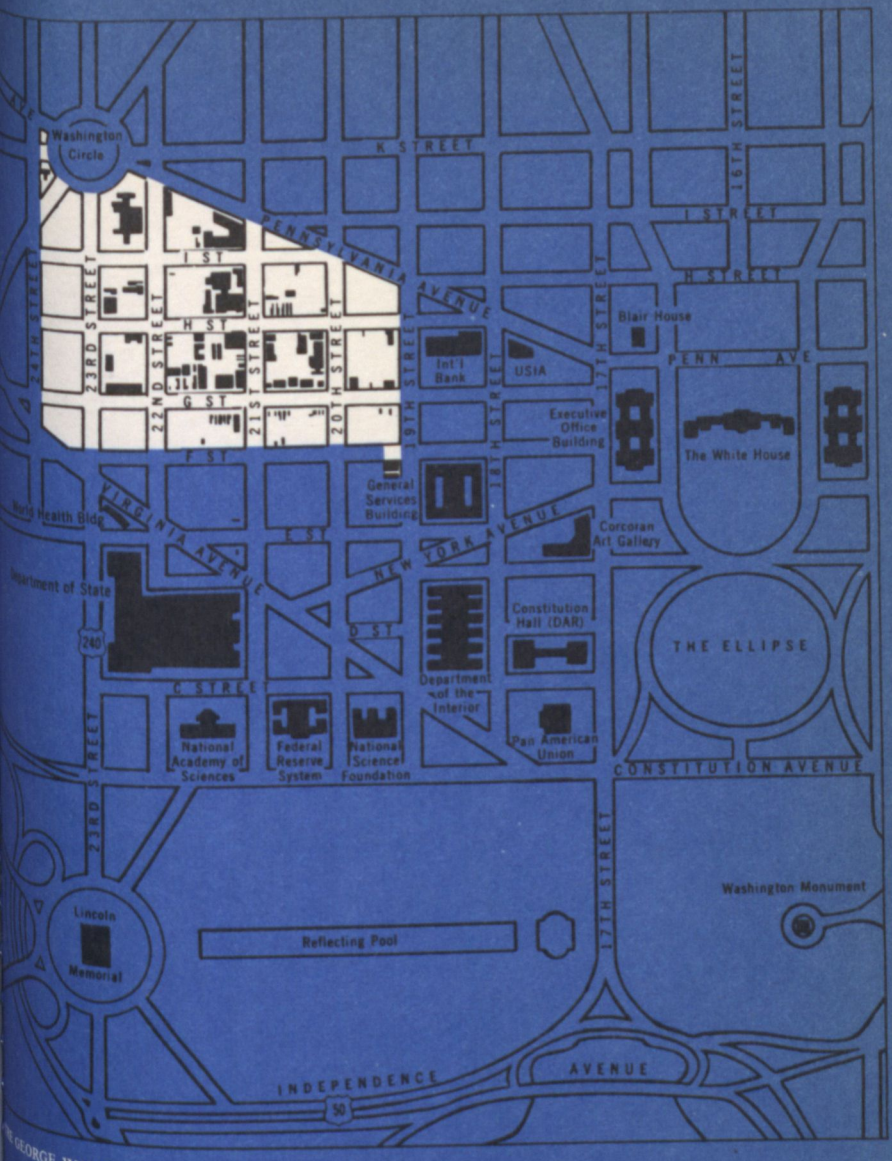


FACTS ABOUT GEORGE WASHINGTON UNIVERSITY

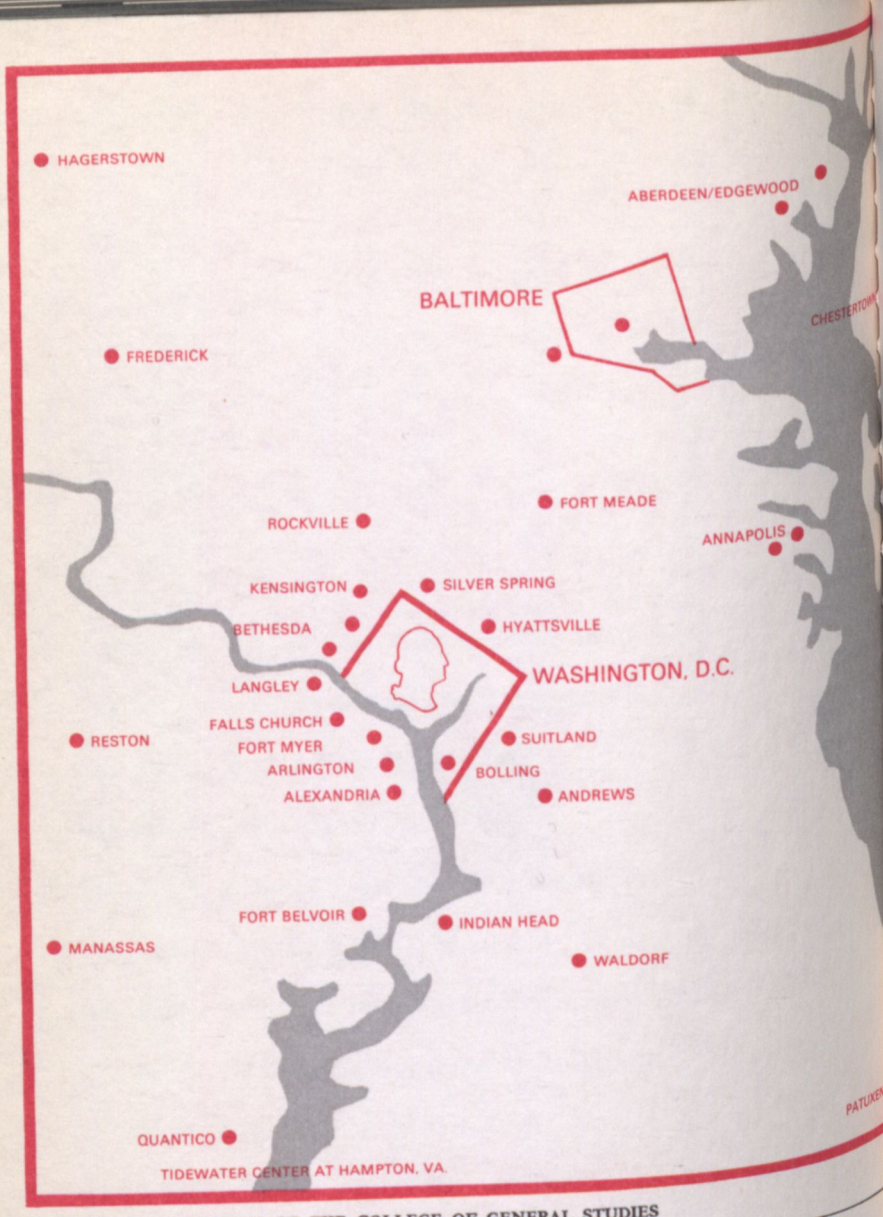
General Information	Private, nonsectarian, coeducational, founded 1821
Location	Washington, D.C., bounded by Pennsylvania Avenue and 19th, F, and 24th Streets, N.W.
Number of Students	15,160 (9,749 men, 5,411 women)
Number of Undergraduates	5,481 (3,034 men, 2,447 women)
Geographical Origin of Students	50 states, District of Columbia, 101 countries; 20% are from the Washington area
Number of Full-time Faculty	810 (78% with Doctoral degrees)
Number of Part-time Faculty	349 (includes some of the most distinguished men in Washington who serve as professorial lecturers)
Residence Hall Space	1,965 (an additional 2,000 students reside in fraternity houses, rooms, and apartments on or near the campus)
Room and Board	Cost varies from $1,415 to $1,575 for the academic year (see page 156)
Campus Organizations	150

Undergraduate majors: Accounting, American Civilization, American Literature, Anthropology, Applied Mathematics, Applied Statistics, Art History, Biology, Botany, Business Administration, Cartography, Chemistry, Chinese Language and Literature, Chinese Studies, Civil Engineering, Classical Archaeology and Anthropology, Classical Archaeology and Classics, Classical Humanities, Dramatic Art, Economics, Electrical Engineering, Elementary Education, English Literature, Environmental Health, Environmental Studies, Fine Arts, French Language and Literature, Geodesy, Geography, Geology, Germanic Languages and Literatures, History, International Affairs, Journalism, Latin, Latin American Studies, Mathematical Statistics, Mathematics, Mechanical Engineering, Medical Technology, Music (Applied, History and Literature, Theory), Oceanography, Philosophy, Physical Education, Physics, Political Science, Premedicine, Psychology, Public Affairs, Religion, Russian Language and Literature, Russian Literature and Culture—in Translation, Secondary Education, Sociology, Spanish American Literature, Spanish Language and Literature, Speech Communication, Speech Pathology and Audiology, Urban Affairs, Zoology.

Study leading to graduate or professional degrees is offered in the Graduate School of Arts and Sciences, the National Law Center, the School of Medicine, the School of Engineering and Applied Science, the School of Education, the School of Government and Business Administration, and the School of Public and International Affairs.



GEORGE WASHINGTON UNIVERSITY CAMPUS / WASHINGTON, D.C.



OFF-CAMPUS LOCATIONS OF THE COLLEGE OF GENERAL STUDIES

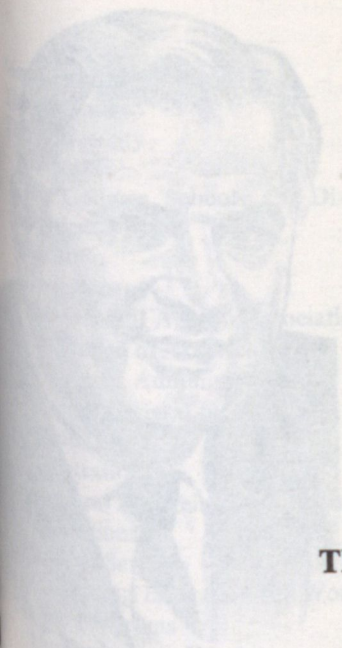
THE GEORGE WASHINGTON UNIVERSITY BULLETIN
Volume LXXI, Number 9, June, 1973

Published by The University at Washington, D.C. 20006

MONTHLY: JANUARY, MAY, JUNE, JULY
(2 ISSUES IN DECEMBER, FEBRUARY, APRIL)

Second Class Postage Paid at Washington, D.C.

THE GEORGE WASHINGTON UNIVERSITY BULLETIN



THE COLLEGE OF GENERAL STUDIES 1973–1974

WASHINGTON, D.C. 20006

From the Dean's Desk

The College of General Studies enters the new academic year prepared to respond to many new demands in the field of higher education. The College of General Studies is constantly working with other colleges and schools of the University to offer programs adapted to the changing requirements of the community which we serve, and the past year has seen some major changes in this area. While we continue to offer a broad range of courses at numerous off-campus centers, we also see increasing emphasis on programs designed for groups of students with special academic interests and special scheduling needs. The trend is to utilize contractual arrangements with the government or business community, such as our recent agreement with the National Science Foundation. The Special Studies programs, such as those in Telecommunication Operations, Urban Learning, and Investigative Techniques, demonstrate how courses from several diverse disciplines can be combined into cohesive degree programs meeting the demands of defined groups of students. The new accelerated Associate's degree courses at Washington Navy Yard illustrate how traditional programs can be fit into new time frames, while the GWU Program for Afloat College Education offered through our Tidewater Center illustrates how such programs can be adapted to almost any physical location. As the College extends its resources to support the development of such new programs, however, it is also aware of the need to support the University's objective of maintaining the academic quality of the off-campus programs so that the degree that is the end result will continue to have real value to the graduate as he works to achieve his professional goals.

Eugene R. Magruder
Dean
College of General Studies

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THE CALENDAR 1973–74*

1973

SEPTEMBER

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1974

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AUGUST

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25	26	27	28	29	30	31

1973 FALL SEMESTER

August 14–September 1 — Long Session and First Short Session off-campus regi
tration † (days of registration and beginning classes wi
be announced in the *Off-campus Schedule of Classes*)

Application for February graduation due as part
registration

‡September 6–8 — Registration on campus † *Thursday–Saturday*

Application for February graduation due as part
registration

September 10 — Classes begin on campus *Monday*

September 10 — Long Session, First Short Session, and School of En
neering and Applied Science off-campus classes beg
Monday

* Off-campus courses organized at any time.
† Application for Master's Comprehensive Examinations is the student's responsibility and m
be made when registering for last courses required for degree.
‡ Hours of registration will be announced in the Campus *Schedule of Classes*.

October 8 No off-campus classes *Monday*

October 15–26 Second Short Session off-campus registration † (days of registration and beginning classes will be announced in the *Off-campus Schedule of Classes)*

Application for February graduation, if not filed previously, due as part of registration

October 22 No off-campus classes *Monday*

**October 29* Last day of First Short Session off-campus fall-semester classes *Monday*

November 5 Second Short Session off-campus classes begin *Monday*

November 20 D.Sc. dissertations of February candidates due *Tuesday*

November 21 Thanksgiving recess begins after last class *Wednesday*

November 26 Classes resume *Monday*

November 30– M.A. in Sp.Std., M.S. in Adm., and M.S. in Sp.Std.

December 1 Comprehensive Examinations *Friday-Saturday*

December 3 School of Engineering and Applied Science Master's theses of February candidates due in Dean's Office *Monday*

December 6 Last day of campus fall-semester classes and School of Engineering and Applied Science off-campus classes *Friday*

December 8 M.A. in Ed. Comprehensive Examinations *Saturday*

December 12–21 Campus examination period and School of Engineering and Applied Science off-campus examination period *Wednesday–Friday*

December 17 Last day of Long Session off-campus fall-semester classes *Monday*

**December 17–22* Off-campus examination period for Long Session *Monday–Saturday*

**December 21* Last day of Second Short Session off-campus fall-semester classes *Friday*

January 2 Master's theses (other than those in the School of Engineering and Applied Science) of February candidates due in Dean's Office *Wednesday*

1974 SPRING SEMESTER

January 2–12 Long Session and First Short Session off-campus registration † (days of registration and beginning classes will be announced in the *Off-campus Schedule of Classes)*

Application for May graduation due as part of registration

‡*January 10–12* Registration on campus † *Thursday–Saturday*

Application for May graduation due as part of registration

January 14 On-campus classes and School of Engineering and Applied Science off-campus classes begin *Monday*

*off-campus final examination may be given at the last class meeting.

†Application for Master's Comprehensive Examinations is the student's responsibility and must be made when registering for last courses required for degree.

‡Hours of registration will be announced in the Campus *Schedule of Classes.*

January 21	Long Session and First Short Session off-campus classes begin *Monday*
February 18	Winter Convocation (holiday) *Monday*
February 25–March 8	Second Short Session off-campus registration * (days of registration and beginning classes will be announced in the *Off-campus Schedule of Classes)*
	Application for May graduation, if not filed previously, due as part of registration
†*March 6*	Last day of First Short Session off-campus spring-semester classes *Wednesday*
March 9	Spring recess begins after last class *Saturday*
March 18	Classes resume *Monday*
March 18	Second Short Session off-campus classes begin *Monday*
March 19	D.Sc. dissertations of May candidates due *Tuesday*
April 5	School of Engineering and Applied Science Master's theses of May candidates due in Dean's Office *Friday*
April 12–13	M.A. in Sp.Std., M.S. in Adm., and M.S. in Sp.Std. Comprehensive Examinations *Friday–Saturday*
April 15	M.S. in Adm. theses of May candidates due in Dean's Office *Monday*
April 19	Last day of campus spring-semester classes and School of Engineering and Applied Science off-campus classes *Friday*
April 20	M.A. in Ed. Comprehensive Examinations *Saturday*
April 25–May 4	Campus examination period and School of Engineering and Applied Science off-campus examination period *Thursday–Saturday*
April 29	Last day of Long Session off-campus spring-semester classes *Monday*
†*April 29–May 4*	Off-campus examination period for Long Session *Monday–Saturday*
†*May 1*	Second Short Session off-campus spring-semester classes end *Wednesday*
May 5	Commencement *Sunday*

1974 SUMMER SESSIONS

There are two six and one-half-week sessions and one thirteen-week session. Days of registration and beginning classes will be announced in the *Off-campus Schedule of Classes.*

* Application for Master's Comprehensive Examinations is the student's responsibility and must be made when registering for last courses required for degree.
† Off-campus final examination may be given at the last class meeting.

THE UNIVERSITY

HISTORY

GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington, whose name it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the Federal City. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended "a fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "That persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets extending north from Florida Avenue to somewhat beyond Columbia Road. The Medical School was located downtown. For the better part of the Columbian University period, the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. The area is not without its reminders of historic interest to the University. President Monroe, who signed the charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for fifty years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he had hoped to see established.

THE COLLEGES, SCHOOLS, AND DIVISIONS

George Washington University includes eleven colleges, schools, and divisions, as follows:

*Columbian College of Arts and Sciences** offers four-year programs in the arts and sciences leading to the degrees of Bachelor of Arts, Bachelor of Science, and (in cooperation with the Department of Pathology and the University Hospital) Bachelor of Science in Medical Technology. The College also provides prelegal and premedical programs, and the preprofessional work required for admission to the School of Education and the School of Public and International Affairs. Columbian College also has academic jurisdiction over off-campus programs leading to the degrees of Associate in Arts in General Studies, Bachelor of General Studies, Bachelor of Science in Environmental Health, Bachelor of Science in Geodetic and Cartographic Science, and Bachelor of Science in Oceanography. These off-campus programs are administered by the College of General Studies.

The Graduate School of Arts and Sciences† offers advanced study and research leading to the degrees of Master of Arts, Master of Arts in Special Studies, Master of Fine Arts, Master of Music, Master of Science, Master of Science for Teachers, Master of Science in Forensic Science, Master of Science in Special Studies, and Doctor of Philosophy. The degrees of Master of Arts in Special Studies, Master of Science in Forensic Science, and Master of Science in Special Studies are also available through off-campus programs administered by the College of General Studies.

The School of Medicine and Health Sciences†* offers work leading to the degree of Doctor of Medicine. The School is also offering programs of study leading to the following undergraduate degrees: Associate in Science (Medical Laboratory Technique), Associate in Science (X-ray Technology), and Bachelor of Science in Allied Health Science (Physician's Assistant). The Associate in Science (Medical Laboratory Technique) degree is offered off campus; the Associate in Science (X-ray Technology) degree is offered both on and off campus. The off-campus programs are administered by the College of General Studies.

The National Law Center offers courses leading to the degrees of Juris Doctor, Master of Laws, Master of Comparative Law, Master of Comparative Law

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* Columbian College of Arts and Sciences cooperates with the School of Medicine and Health Sciences in offering a program leading to the combined degrees of Bachelor of Arts and Doctor of Medicine.

† The Graduate School of Arts and Sciences cooperates with the School of Medicine and Health Sciences in offering a program leading to the combined degrees of Master of Science and Doctor of Medicine and a dual program leading to the degrees of Doctor of Medicine and Doctor of Philosophy.

merican Practice), and Doctor of Juridical Science; and special programs in ntinuing Legal Education.

The School of Engineering and Applied Science offers courses leading to the gree of Bachelor of Science in the following areas: Civil Engineering, Elec- al Engineering, and Mechanical Engineering. Graduate programs lead to degrees of Master of Science, Master of Engineering Administration, and ctor of Science. The School also has academic jurisdiction over the off- mpus programs leading to the degrees of Master of Science, Master of En- eering Administration, and Doctor of Science. These off-campus programs administered by the College of General Studies.

The School of Education offers undergraduate programs leading to the de- es of Bachelor of Arts in Education and Bachelor of Science in Physical Ed- ation; graduate studies leading to the degrees of Master of Arts in Education, ster of Arts in Teaching, Education Specialist, and Doctor of Education. e degree of Master of Arts in Education is also available through off-campus ograms administered by the College of General Studies.

The School of Government and Business Administration offers undergradu- programs leading to the degree of Bachelor of Business Administration and duate programs leading to the degrees of Master of Arts in Government, ster of Arts in Health Care Administration, Master of Business Administra- n, Master of Public Administration, Master of Urban and Regional Planning; e Post-Master's Graduate Certificate in Health Care Administration; the de- es of Doctor of Business Administration and Doctor of Public Administra- n. The School also has academic jurisdiction over the off-campus programs ading to the degrees of Bachelor of Science in Administration and Master of ience in Administration. These off-campus programs are administered by the llege of General Studies.

The School of Public and International Affairs offers undergraduate pro- ms leading to the degree of Bachelor of Arts and graduate programs leading the degree of Master of Arts. The School offers an off-campus program ading to the degree of Master of Science in International Affairs.

The College of General Studies supplements the adult education program of e University through campus and off-campus study; conferences, seminars, d special projects; and continuing education and noncredit programs. This llege also administers the off-campus programs over which Columbian Col- ge of Arts and Sciences, the Graduate School of Arts and Sciences, the hool of Education, the School of Engineering and Applied Science, the hool of Government and Business Administration, and the School of Medi- ne and Health Sciences have academic jurisdiction.

The Division of University Students makes available courses for students not ndidates for degrees in this University.

The Summer Sessions.

ADEMIC STATUS

orge Washington University is accredited by its regional accrediting agency, e Middle States Association of Colleges and Secondary Schools.

The University is on the approved list of the American Association of Uni- rsity Women and is a member of the College Entrance Examination Board.

The School of Education is a charter member of the American Association f Colleges for Teacher Education and is accredited by the National Council

for Accreditation of Teacher Education for its Bachelor's and Master's degre programs.

The School of Government and Business Administration has maintained full membership in the Middle Atlantic Association of Colleges of Business Admin istration since 1961. It joined the Council on Graduate Education for Public Administration in 1966. By invitation, in 1968, the School became a charter academic member of the American Association of Collegiate Schools of Business Assembly. The programs in Public Accounting designed to prepare students for Certified Public Accountants examinations have been approved by the state boards of New York and of Maryland. The program in Hospital Administration is accredited by the National Accrediting Commission on Graduate Education for Hospital Administration. The Department of Chemistry is on the approved list of the American Chemical Society. The graduate program in clinical psychology in the Department of Psychology is on the approved list of the American Psychological Association. The program in speech pathology and audiology is accredited by the Education and Training Board of the American Boards of Examiners in Speech Pathology and Audiology.

LOCATION

The University is in downtown Washington, between Pennsylvania Avenue and 19th, F, and 24th Streets, N.W. In immediately adjacent areas are the White House, the World Bank, the United States Information Agency, the Corcoran Gallery of Art, the Department of State, the Department of the Interior, the General Services Administration, the National Academy of Sciences, and the Kennedy Center for the Performing Arts.

GOVERNMENT

The University is privately endowed and is governed by a self-perpetuating Board of Trustees, with the President of the University as an ex officio member. The members of the Board are named for a period of three years and are divided into three classes. The members of one class are elected at each annual meeting to fill the places of the members whose terms of office expire. Two members of each class are nominated by the Alumni Association.

THE GENERAL ALUMNI ASSOCIATION

The objectives of this Association are to unite the graduates who wish to associate themselves for charitable, educational, literary, and scientific purposes, and to promote the general welfare of the University.

Eligible members are those who have matriculated in any school of the University and who have left the University in good standing, or any person who is or has been a member of the teaching, research, or administrative staff of the University, or of the Board of Trustees of the University. Active members are those who are life members of the George Washington University General Alumni Association or the Alumni Association of any school of the University, or are current contributors to the George Washington University Fund.

The Alumni Office is in Bacon Hall, 2000 H Street, N.W., Washington, D.C. 20006.

All alumni are urged to keep the Alumni Office informed of changes of address or occupation and to supply information with regard to their fellow alumni.

THE BOARD OF TRUSTEES

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Franklin J. Lunding, LL.B., LL.D.
Jeremiah Milbank, Jr., B.A., M.B.A.
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Flaxie M. Pinkett, B.A.
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Charles McKay Chambers, Ph.D., *Associate Dean of the College of General Studies, for Planning and Development*
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Ruth H. Osborn, Ed.D., *Assistant Dean of the College of General Studies, for Continuing Education for Women*

* Alumni trustee.

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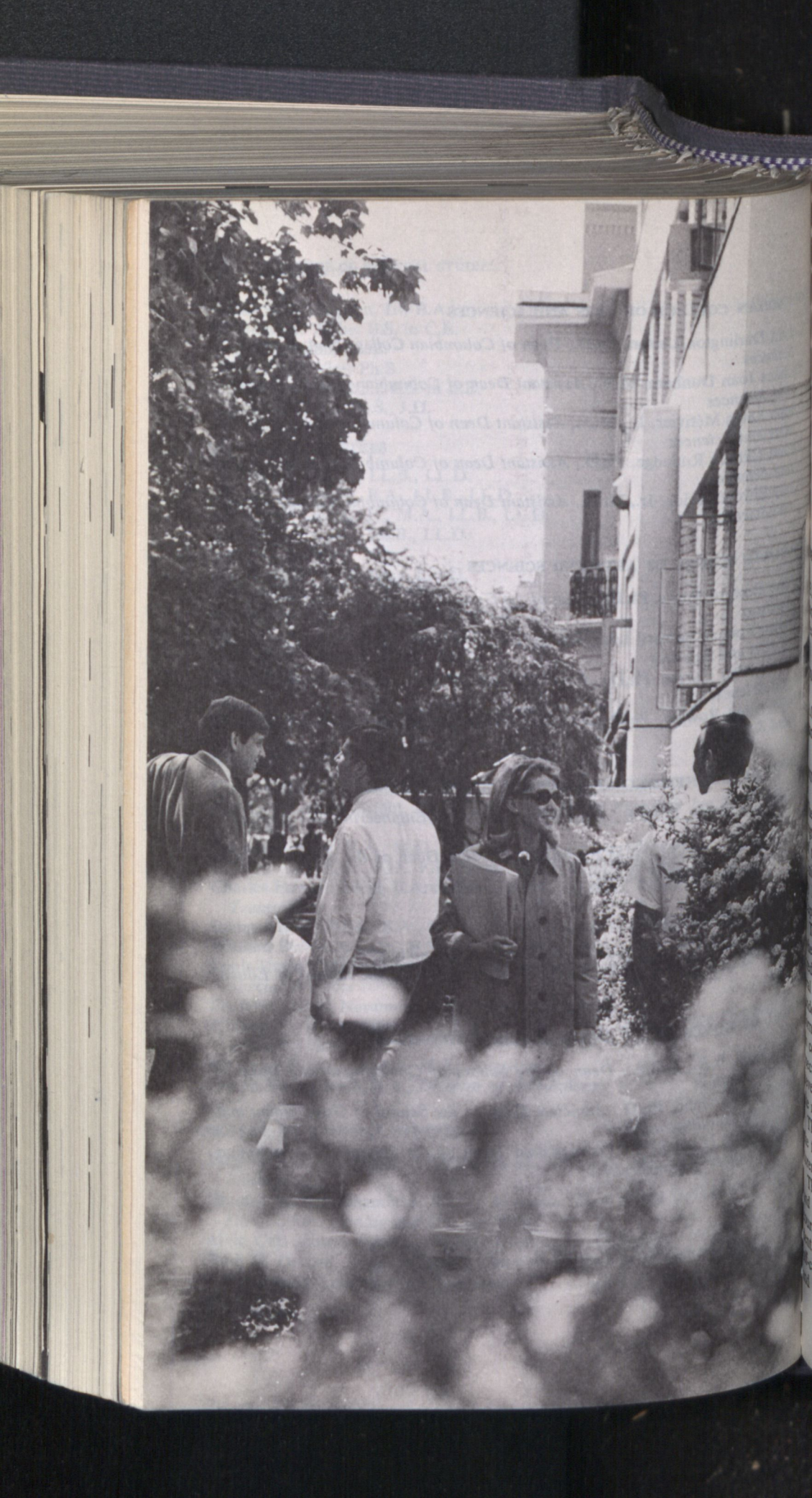

COLLEGE OF GENERAL STUDIES

Dean E.R. Magruder
Associate Deans C.M. Chambers, A.C. Jensen
Assistant Dean Ruth H. Osborn

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...RODUCTION

...College of General Studies, the off-campus division of George Wash... University, was established in 1950 to extend the educational resources ...e University to the community. The College continues in expanding the ...ersity's activities by providing academic programs for adult students and ...elping to meet the continuing educational requirements of the National ...al area.

...e College offers off-campus credit courses for the nondegree student, ...her for personal enrichment or for updating or upgrading his professional ...entials. Off-campus degree programs, administered by the College of Gen... Studies for other colleges and schools of the University, are offered at the ...graduate and graduate levels for students who wish to pursue a more ...al program of study. Experimental pilot programs of study are developed ...operation with other colleges and schools of the University in response to ...ic needs of the government and business community. The College also ...ops and conducts noncredit courses, seminars, and workshops drawing on ...sources of the University.

...e Staff of Instruction for the off-campus programs includes members of ...full-time faculty of the University and academically qualified part-time lec... from the Washington professional community.

...e College works closely with education directors, public school officials, ...personnel administrators in government, business, and industry to develop ...es of study and expand the educational opportunities for the mature stu... In cooperation with these sponsoring groups the College offers courses at ...ampus centers throughout the District of Columbia and in nearby Maryland ...Virginia. Government agencies and installations, business organizations, or

professional groups interested in having the College organize and conduct
course or a comprehensive educational program should contact the Associat
Dean of the College of General Studies.

ACADEMIC STATUS

The academic standards of the University are maintained in off-campus cred
courses.

The College of General Studies is accredited by its regional accreditin
agency, the Middle States Association of Colleges and Secondary Schools.

DEGREE PROGRAMS

Columbian College of Arts and Sciences offers the following degrees off cam
pus:

- Associate in Arts in General Studies
- Bachelor of General Studies
- Bachelor of Science in Environmental Health
- Bachelor of Science in Geodetic and Cartographic Science
- Bachelor of Science in Oceanography

The Graduate School of Arts and Sciences offers the following degrees o
campus:

- Master of Arts in Special Studies
- Master of Science in Forensic Science
- Master of Science in Special Studies

The School of Engineering and Applied Science offers the following degre
off campus:

- Master of Engineering Administration
- Master of Science
- Doctor of Science

The School of Education offers the following degrees off campus:

- Master of Arts in Education

The School of Government and Business Administration offers the followi
degrees off campus:

- Bachelor of Science in Administration
- Master of Science in Administration

SPECIAL CREDIT PROGRAMS AND NONDEGREE PROGRAMS

SPECIAL CREDIT PROGRAMS

To encourage participation in foreign-tour programs and continuing educatio
throughout life, courses designed to meet needs of interested individuals, group
and agencies are offered in the liberal arts, education, and other areas. F
further information contact one of the persons listed below.

NONDEGREE PROGRAMS

Courses, conferences, seminars, and institutes are offered to meet the needs
individuals and groups. They are designed for business, industry, and profe
sional groups. For further information contact one of the persons listed belo

or information on programs in a general area, contact Charles Chambers, Associate Dean of the College of General Studies, for Planning and Development, elephone 676-7070.

or information on programs in allied health, contact Earl Ross, Coordinator f Allied Health Sciences and LEEP Programs, telephone 676-7320.

or information on programs concerning women, contact Ruth Osborn, Assistnt Dean of the College of General Studies, for Continuing Education for omen, telephone 676-7036.

or information on Teacher's Programs, contact the geographic area director ee below).

or information on programs in specific geographic areas, contact Ralph Deeles, Director of District of Columbia Programs, telephone 676-7061; Douglas arter, Director of Maryland Programs, telephone 676-7022; John Morrow, irector of Virginia Programs, telephone 676-7040.

Admission

NO STUDENT may be denied admission to the University because of sex, race, color, or national origin.

NONDEGREE STUDENTS

Off-campus credit courses may be taken by nondegree students who meet the prerequisites prescribed by the department concerned; if they have previously attended a college or university, they must be in good standing. Formal University admission is not required for registration.

Nondegree students wishing to enroll in graduate courses other than those offered by the School of Government and Business Administration must have completed a Bachelors degree, or have 90 semester hours of undergraduate work and the permission of the instructor. Nondegree students who have not completed a Bachelor's degree may not enroll in graduate courses offered by the School of Government and Business Administration.

Credits earned as a nondegree student may later be transferred to degree programs at George Washington University or other colleges and universities, providing they are applicable to the desired curriculum and providing the student meets the requirements of the degree program for which he is applying.

ADMISSION AS A DEGREE CANDIDATE

Students wishing to be admitted as candidates for one of the off-campus undergraduate or graduate degree programs of George Washington University may obtain application forms from the College of General Studies, one of the University's representatives of the Off-campus Credit Programs, or the Education Officer of his agency or installation. For admissions procedure to campus degree programs, refer to the *Undergraduate and Graduate Catalogue* or the *School of Engineering and Applied Science* catalogue of George Washington University.

An application for admission, required credentials, and a nonrefundable application fee* of $10 (for undergraduate study) or $25 (for graduate study) should be sent to the appropriate office.

Records presented become the property of the University and *cannot* be returned.

UNDERGRADUATE DEGREE CANDIDACY

Completed application, required credentials, and the application fee should be sent to the Office of Admissions, George Washington University, 2121 Eye Street, N.W., Washington, D.C. 20006.

Secondary school graduates applying for Associate in Arts in General Studies or Bachelor's degree candidacy must present the combined evidence of

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* The application fee must be by check or postal money order, payable to George Washington University.

The application fee is waived for a student applying for readmission who was registered as a degree candidate at the time of his last registration at this University and has not since registered at another institution.

an acceptable certificate of graduation from an accredited secondary ool, showing a minimum of fifteen "units"* in a college preparatory or demic curriculum; (2) the principal's statement that the applicant is adetely prepared to undertake college work with reasonable prospect of suc-; (3) College Entrance Examination Board scores on the Scholastic Apti- Test and the English Composition Achievement Test (for students out of school several years, other appropriate tests may be prescribed). The Col- Entrance Examination Board tests are preferred; however, the American lege Testing battery scores will be accepted. The applicant should request these scores be sent to the Office of Admissions directly from the Educa- Testing Service, Princeton, N.J., or Berkeley, Calif.; or from the Ameri- College Testing Program, Iowa City, Iowa.

Applicable only to Columbian College of Arts and Sciences.—Mature stus who do not meet the above requirements may be considered for degree didacy after the satisfactory completion of at least 15 semester hours of rse work with grades of *B* or better in 60 per cent of course work. This st include courses in English Composition (Engl 1 or 1*x* and 2), and 9 ester hours of course work in at least two of the following appropriate as: Humanities (literature, philosophy, foreign languages), Social Studies thropology, economics, geography, history, political science, psychology, ology), Natural and Mathematical Sciences.

The selection of qualifying courses should be made in conference with the ulty adviser, and a conference concerning plans for study is required of h applicant for admission to candidacy.

Applicable only to the School of Government and Business Administration. Students who have been out of secondary school for three years or more and o do not meet the above requirements may be considered for degree can- acy after the satisfactory completion of at least 15 semester hours of course rk with a quality-point index of 2.50 or higher. This must include courses English Composition (Engl 1 or 1*x* and 2), and 9 semester hours of course rk selected from the first-year curriculum of the Bachelor of Science in Adistration degree program.

The selection of qualifying courses should be made in conference with the ulty adviser. A conference concerning plans for study as a degree candidate required of each applicant before admission to candidacy.

VANCED STANDING AND ADVANCED PLACEMENT

NSFER STUDENTS FROM OTHER COLLEGES AND UNIVERSITIES

perly certified courses taken at accredited colleges or universities may be plied toward a degree, subject to the curriculum requirements of the degree ogram and the rules of the college or school to which admission is sought. counting and Business Administration courses taken at accredited 2-year colges may be applied toward the degree of Bachelor of Science in Administraon provided they are comparable to the School of Government and Business dministration courses numbered below the 100 level.

* A unit represents a year's study in a secondary school subject, including in the aggregate no less n 120 sixty-minute periods, or the equivalent, of prepared classroom work.

Although a grade of *D* is not acceptable for transfer, the course may be used to satisfy a curriculum requirement. The *D* grade may not, however, be counted toward the total number of semester hours required for the degree. Any course completed with a grade of *D* or better may not be repeated for the purpose of earning degree credit.

Transfer students whose previous academic records raise doubts of their ability to complete degree requirements successfully must complete 15 hours of course work in this College with a quality-point index of 2.50 or higher, or grades of *B* or better in 60 per cent of course work, to be considered for degree candidacy. Courses taken to qualify for candidacy must be distributed over two or more of the following areas: Humanities (literature, philosophy, foreign language), Social Studies (anthropology, economics, geography, history, political science, sociology), and Natural and Mathematical Sciences. (Students who have not successfully completed an acceptable college course in English Composition must include Engl 1 or 1*x* and 2.) Applicants who have been suspended for academic reasons from this University or another institution must fulfill this same 15-hour requirement and also obtain written approval of a petition for admission to degree candidacy from the Committee on Admission and Advanced Standing of Columbian College of Arts and Sciences or from the Dean of the School of Government and Business Administration.

In no case will more than 60 semester hours of advanced standing be granted for course work completed at a 2-year or junior college to those students planning to enroll in the Bachelor of Science in Administration degree program.

The University reserves the right to refuse credit for transfer in whole or in part, or to allow it provisionally. Credit so given may be withdrawn for subsequent poor work.

It is the responsibility of the student to have an official transcript sent directly from each institution formerly attended to the Office of Admissions, George Washington University, Washington, D.C. 20006.

If the transcript from a higher institution includes the record of his secondary school work, it is not necessary for the applicant to have forwarded a separate record from the principal of the secondary school.

EARNING CREDIT OR WAIVING REQUIREMENTS BY EXAMINATION

In addition to credit allowed in transfer from other accredited colleges or universities, a maximum of 30 semester hours of advanced standing may be obtained by any one or any combination of the following methods.

A student may earn up to a maximum of 30 hours, or waive curricular requirements without limitation *(passing a waiver examination does not entitle the student to any semester hours of credit)*, by performing satisfactorily on any or all of the following:

Advanced Placement Tests (APT).—Administered by the College Entrance Examination Board.

Achievement Tests (may be used to waive requirements only).—Administered by the College Entrance Examination Board.

College Entrance Examination Board College-Level Examination Program (CLEP).—CLEP offers two types of examinations: (1) CLEP Subject Examinations are offered in 29 subject areas. These tests measure achievement in the equivalent of specific college-level courses. (Credit may not be earned by passing the examination after having taken the equivalent course.) (2) CLEP General Examinations are designed for students whose post-secondary education

been unorthodox. Therefore, a student who was regularly enrolled in a
-secondary program of education within three years of graduation is nor-
ly ineligible for credit through CLEP General Examinations. The General
minations are offered in five areas: Mathematics; Social Sciences; Humani-
Natural Sciences; and English Composition. Duplicate credit is not per-
ible. (Credit—advanced standing—is not given for the General Test in
glish Composition.)

pecial Department Examinations in Columbian College of Arts and Sciences. A student may request any department of Columbian College to offer him a cial examination covering the subject matter of any specific course. (If an propriate CLEP Subject Examination is available, the department may ose to employ it.) If a student performs satisfactorily, he may receive dit (advanced standing), waiver of a requirement, or both, at the discretion the department. Special departmental examinations will normally be of at t three hours' duration. A fee of $25 for each course examination is charged preparing, administering, and grading.

ervice Schools.—A maximum of 30 (or a maximum of 12 hours if the rses are "professional") semester hours may be obtained on the basis of serv- schools satisfactorily completed, as evaluated in accordance with the "Guide he Evaluation of Educational Experience in the Armed Forces." Ordinarily h subjects are counted as electives. No credit will be allowed for military erience as such.

Correspondence Courses.—Except for those students enrolled as candidates the Bachelor of Science in Geodetic and Cartographic Science or the Bach- of Science in Oceanography degree, a maximum of 15 semester hours may earned through the successful completion of correspondence courses of col- e level which are offered by the U.S. Armed Forces Institute or a regionally credited college or university.

Examination for Waiving Curriculum Requirements.—During the first full mester of undergraduate degree candidacy, a student wishing to omit a re- red course may, with the permission of the faculty adviser, take a waiver mination, the passing of which relieves him of the curriculum requirement d qualifies him for registration in an advanced course. The fee for each 3- r course examination is $5.

Credit Earned Through United States Armed Forces Institute (USAFI).—cept for those students enrolled as candidates for the Bachelor of Science in inistration degree, credit is assigned for approved United States Armed rces Institute college-level examinations passed with satisfactory scores.

RADUATE DEGREE CANDIDACY

STER'S DEGREES

The Degree of Master of Arts in Education (School of Education).—Ap- ation for Master's degree candidacy should be made by the time of regis- ation. Completed application, required credentials, and the application fee ould be sent to the Office of the Dean, School of Education, 2201 G Street, W., Washington, D.C. 20006.

Admission to graduate study toward a Master's degree requires a Bachelor's egree from an accredited institution, an undergraduate quality-point index of .50 (a C + average) or above, demonstrated interest in teaching, appropriate

undergraduate work, and personal traits that show promise as a teacher. Two years of successful teaching are required before admission to candidacy in the field of school administration.

The Degree of Master of Science in Administration (School of Government and Business Administration).—Application for Master's degree candidacy *must* be made before or at the time of registration for the initial course work. Completed application, required credentials, and the application fee should be sent to the Admissions Officer, School of Government and Business Administration, 710 21st Street, N.W., Washington, D.C. 20006.

The general requirement for Master's candidacy is a Bachelor's degree, including at least 90 semester hours of academic work from a regionally accredited college or university with an over-all quality-point index of 3.00 (a *B* average), adequate undergraduate preparation for the chosen area of concentration, and satisfactory performance on the Admission Test for Graduate Study in Business*.

The Admission Test for Graduate Study in Business must be taken prior to application for degree candidacy or during the semester in which application is made. For information concerning the date and place for taking the test, contact the Educational Testing Service, Box 955, Princeton, N.J. 08540.

No more than 6 semester hours of credit toward the Master's degree will be granted for work taken in nondegree status at this University (before application to this degree program and while the application is being processed).

A maximum of 6 semester hours of advanced standing may be credited toward the degree by transfer of credit for approved graduate work taken at an accredited college or university. Request for advanced standing must be made at the time of application for Master's degree candidacy.

The Degrees of Master of Arts in Special Studies or *Master of Science in Special Studies (Graduate School of Arts and Sciences).*—These Master's degree off-campus programs are arranged for groups of students participating in a particular program which has been approved by the Graduate School of Arts and Sciences. Application for Master's degree candidacy must be made by members of the group before registration. Completed application, required credentials, and the application fee should be sent to the Office of the Dean, Graduate School of Arts and Sciences, 2000 H Street, N.W., Washington, D.C. 20006.

Admission to graduate study toward a Master's degree in this School requires a Bachelor's degree, from an accredited college or university, with an over-all quality-point index of 3.00 (a *B* average) or an equivalent grade.

No more than 6 semester hours of credit toward a Master's degree will be granted for work taken in nondegree status at this University.

A maximum of 6 semester hours of advanced standing may be credited toward a Master's degree by transfer of credit for approved graduate course work taken at an accredited college or university.

The Degrees of Master of Science or *Master of Engineering Administration (School of Engineering and Applied Science).*—Application for Master's degree candidacy *must* be made by the time of registration. Completed application, required credentials, and the application fee should be sent to the Director of Engineering Admissions, School of Engineering and Applied Science, 725 23rd Street, N.W., Washington, D.C. 20006.

* This is a test of general aptitude and does not presume an undergraduate major in Business Administration.

dmission to graduate study toward a Master's degree requires an appropriate elor's degree from a recognized institution and evidence of capacity for uctive work in the field selected, as indicated by undergraduate grades, luate Record Examination scores, and similar data.

applicant who has significant deficiencies in preparation may be required ke prescribed undergraduate courses as an unclassified student before admitted to graduate student status. In some cases, if such deficiencies inimal, he may be admitted to graduate student status and allowed to a limited number of graduate courses while completing the undergraduate es in which he is deficient. In no case may the undergraduate courses thus fulfill any part of the requirements for the Master's degree.

udents wishing to apply for admission to the program of study leading to degree of Master of Engineering Administration are required to meet the wing additional admission requirements: the applicant must have an ade- knowledge of the principles of human relations, the fundamentals of neering economic analysis, and the fundamentals of quantitative methods. requirement can be met by satisfactory completion of the following under- uate courses or approved equivalents: E Ad 150, *Introduction to Technical agement;* E Ad 160, *Introduction to Engineering Economic Analysis;* and 170, *Basic Quantitative Methods for Engineering Administration.* A stu- is required to earn the grade of *C* or better in these courses (unless the irement is stipulated to be a grade of *B* or better upon his admission) in undergraduate prerequisite course. If this scholarship requirement is not the student is barred from further enrollment. A student is not permitted peat any of the undergraduate prerequisite courses. Credit for prerequisite es is not applicable toward the degree of Master of Engineering Adminis- on.

to 6 semester hours of satisfactory credit (with grades of *A* or *B*), which nally must have been earned in a graduate program at another recognized ution, *may* be accepted in transfer, when applicable, to satisfy Master's e requirements in the School of Engineering and Applied Science. How- the student must, with the approval of his adviser, petition to the appro- e department chairman for such a transfer.

TOR OF SCIENCE DEGREE

he Degree of Doctor of Science (School of Engineering and Applied nce).—The prospective doctoral student seeking admission should apply re June 1 for the fall semester and before December 1 for the spring se- er. Personal interviews may then be arrangd to discuss the applicant's ifications and the possibilities for an effective doctoral program. The appli- must arrange for complete documentary records (transcrips) to be for- ded to the Director of Engineering Admissions, School of Engineering and lied Science, 725 23rd Street, N.W., Washington, D.C. 20006, in sufficient to permit assembly of complete records for evaluation as soon after the e application deadlines as possible.

o be admitted to the doctoral program, a satisfactory Master's degree from ccredited institution is required, together with acceptable personal qualities a capacity for creative scholarship. Normally, a *B* average in graduate k is required. However, the minimum does not assure automatic accept- ; the departments may, and often do, set higher admission standards. The

applicant must arrange for letters of recommendation to be submitted from two faculty members of the institution from which he received his Master's degree; one of these, if possible, should be from his Master's adviser. The letter should be addressed to the appropriate department chairman.

Up to 6 semester hours of credit earned in courses completed with the grade of *A* or *B* while enrolled in a doctoral program at another accredited institution may be accepted in transfer to satisfy doctoral requirements at this School, subject to the approval of the student's adviser and his department chairman. Credit earned in courses completed more than five years prior to admission to the doctoral program will not be accepted in transfer, and some departments may require that transfer credit must have been earned within a shorter period of time before admission.

For further information contact S.W. Yuan, Professor of Engineering and Applied Science, GWU—NASA-Langley Graduate Program, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20006, or John L. Whitesides, Jr., Assistant Research Professor of Engineering, GWU—NASA-Langley Graduate Program, Mail Stop 211A, NASA-Langley Research Center, Hampton, Va. 23365.

READMISSION

A student who withdraws, is suspended, or is otherwise absent from the University for one semester or more, may re-enter and continue his work only under the rules and regulations in force at the time of his return. Complete and official transcripts from each institution the student has attended since making his previous application must be sent to the appropriate office at this University before his application for readmission can be evaluated.

When there are curriculum changes in graduate programs in the School of Government and Business Administration, the readmitted student may be required to take additional course work in preparation for the Master's Comprehensive Examinations.

Registration

OFF-CAMPUS REGISTRATION is conducted before or at the first class meeting of each course, at times and places stated in the *Off-campus Schedule of Classes*, available well in advance of each semester.

Registration in an off-campus course *constitutes admission to that course only*. It does not admit the student to campus courses or to degree candidacy. Only students admitted to degree candidacy may enroll as full-time students (for 12 semester hours or more). Those who have been graduated from high school recently and wish to be *full-time freshman* students at this University should apply for admission to the appropriate college or school on campus.

Off-campus degree candidates in an area of concentration with a small enrollment which would not justify offering courses off campus may have to register for campus courses in order to meet the requirements for the degree.

Auditing.—With the permission of the instructor, students may register as "Auditors." An auditor is not required to take active part or to take examinations; he receives neither grades nor credit. Tuition is the same for the auditor

for the student registered for credit. With the approval of the Dean, a dent may change from credit to audit status during the first third of the mester. A student who takes a course as an auditor may not repeat it later r credit.

Concurrent Registration.—A student registered as a degree candidate in any her college or school of the University may take credit courses in the College General Studies *only by permission (granted prior to registration) of the* n of the college or school concerned. A "College of General Studies Off-mpus Concurrent Registration Permit" form must be obtained from the propriate college or school, signed by the dean of that college or school, and sented at the time of registration in the College of General Studies.

ervice personnel enrolled full time for campus courses need the permission he Dean of the College of General Studies to register concurrently for off-mpus courses.

ny student taking course work in another college or school of the Univer- or at another institution through the Consortium of Universities of the shington Metropolitan Area, Inc., must have the permission of his Dean.

Fees and Financial Regulations

ALL FEES should be paid by check or money order, made payable to George Washington University.

The following fees were adopted for the academic year 1973–74. (See pages 27–28 for projected tuition and fee increases for 1974–77.)

Tuition

On campus:	
Full-time undergraduate program (12 to 18 hours), each semester	$1,175.00
Part-time undergraduate program or hours in excess of 18, for each semester hour	86.00
Graduate study other than in the School of Engineering and Applied Science, for each semester hour	86.00
Graduate study in the School of Engineering and Applied Science, for each semester hour	88.00
Off campus:*	
For each semester hour	63.00
School of Engineering and Applied Science off-campus programs, for each semester hour†	88.00
ICAF programs, for each semester hour	73.00
Thesis:‡	
ICAF programs, for each semester hour	73.00
Master of Arts in Education and Master of Science in Administration degree programs (other than ICAF), for each semester hour	86.00
School of Engineering and Applied Science programs, for each semester hour†	88.00

University Center Fee (charged only to students registered on campus, nonrefundable)

For students registered for 11 or more semester hours on campus:	
For each semester	37.50
For students registered for less than 11 semester hours in a semester on campus:	
For each semester hour for which the student registers	3.50
For on-campus degree candidates maintaining "continuous registration" status:	
For each semester	3.50

Special Fees

Application fee (undergraduate degree candidate), nonrefundable	10.00
Application fee (graduate degree candidate), nonrefundable	25.00

* Except for ICAF and School of Engineering and Applied Science programs.

† This fee does not apply to special off-campus programs arranged with the School of Engineering and Applied Science.

‡ Payment of tuition for a Master's thesis entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, additional time may be granted in accordance with the regulations of the school in which the student is registered. (See pages 36–37 for regulations governing military leave.)

duation fee, due and payable at the time of registration for the last semester or summer session:

ssociate's degree	$10.00
achelor's, Master's, and Doctor of Science degrees	25.00
cial Columbian College of Arts and Sciences departmental examination fee, for each course to qualify for receiving credit (advanced anding), waiver of requirement, or both	25.00
tinuous Registration fee, *off-campus degree candidates (other than those the School of Engineering and Applied Science)*, to maintain "continuous registration" during any semester of absence from the University*	63.00
tinuous Registration fee, *on-campus or off-campus†, degree candidates the School of Engineering and Applied Science*, to maintain "continuous registration" during any semester of absence from the University or after completion of tuition requirements*	88.00
tinuous Registration fee, *on-campus candidates (other than those in e School of Engineering and Applied Science)*, to maintain "continuous registration" during any semester of absence from the University, or fter completion of tuition requirements*	86.00
tinuous Registration fee, *ICAF degree candidates*, to maintain "continuous registration" during any semester of absence from the University*	73.00
e-registration fee, for failure to register for campus courses within the signated period	15.00
for binding two copies of the Master's thesis (other than ICAF programs)	10.00
for binding two copies of the Master's thesis (ICAF programs)	7.00
for Microfilm Service and Printing Announcement of Final Examination (Doctor of Science candidates)	60.00
e-payment fee, for failure to make payments when due (see "Payment f Fees," pages 29–30)	15.00
campus financial reinstatement fee, for reinstatement after financial cumbrance for nonpayment of fees (see "Payment of Fees," pages 9–30)	35.00
campus financial reinstatement fee, for reinstatement after financial cumbrance for nonpayment of fees (see "Payment of Fees," pages 9–30)	15.00
rned check fee, charged a student whose check is returned because of sufficient funds or improper drafting	15.00
for each examination to waive a curriculum requirement	5.00
nscript fee, charged for each transcript of record	2.00

JECTED TUITION AND FEE INCREASES 1974–77

jected increases for the academic years 1974–75, 1975–76, and 1976–77 e been estimated as follows:

yment of the continuous registration fee entitles the student who is granted leave of absence turn and continue his work toward a degree under the academic requirements which were in at the time of his first registration. The continuous registration fee applies toward neither n fee nor residence requirements for the degree. This fee does not apply to students granted ay leave (see pages 36–37).

n fee does not apply to special off-campus programs arranged with the School of Engineering Applied Science.

On Campus

Increase by year (full-time undergraduate students):

1974–75	$75.00
1975–76	75.00
1976–77	100.00

* Increase by semester hour (graduate and part-time undergraduate students):

1974–75	4.00
1975–76	4.00
1976–77	4.00

The University Center fee will be increased for the 1974 summer sessions and for the academic year 1974–75. For students taking 11 or more semester hours, the fee will be $43.00 a semester, an increase of $5.50. Students taking less than 11 semester hours will pay $4.00 a semester hour, an increase of $.50.

Off Campus

* Increase by semester hour (except ICAF and School of Engineering and Applied Science programs):

Course Work Other than Thesis

1974–75	$4.00
1975–76	3.00
1976–77	3.00

Thesis for Master of Arts in Education and *Master of Science in Administration programs*

1974–75	4.00
1975–76	4.00
1976–77	4.00

* Increase by semester hour (ICAF programs including thesis):

1974–75	5.00
1975–76	3.00
1976–77	3.00

*† Increase by semester hour (School of Engineering and Applied Science programs including thesis):

1974–75	4.00
1975–76	4.00
1976–77	4.00

Every effort will be made to keep tuition increases within the above limits. However, it is not possible to project future economic data with certainty, and circumstances may require an adjustment of these estimates.

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* Semester-hour increases become effective at the beginning of the summer sessions preceding the academic year.

† This increase by semester hour does not include the projected increases for special off-campus programs arranged with the School of Engineering and Applied Science.

MENT OF FEES

-CAMPUS COURSES

s for each semester are due and payable in full at the time of each regis-ion; however, a student registering for a *thirteen-week credit course* may a contract at each registration to make payments in three equal install-nts—one-third at the time of registration, one-third by October 10, 1973, and third by November 10, 1973 (for the fall semester); one-third by Febru-12, 1974, and one-third by March 12, 1974 (for the spring semester). ments are due at the stipulated times. Payment envelopes are provided by College; the University will not obligate itself to notify students of payments

tudents receiving partial government tuition assistance must pay their por-of the tuition in full at the time of registration.

uition and fees for credit courses lasting less than twelve weeks, and for all redit courses, are payable in full at registration.

tudents who fail to make any payment when due will be automatically rged a $15 late-payment fee and will be subject to an interest charge of r cent per annum. Accounts which become 30 days past due will be finan-y encumbered. In the event a student's account is financially encumbered, student forfeits his rights to the use of deferred payment contracts in fu-semesters, and the Student Accounts Office will notify the Registrar to hold grades, future registration privileges, transcripts, diplomas, and other demic information until the account is settled financially. Financial settle-t will require payment in full of all amounts due the University in addi-to a financial reinstatement fee of $15.

tudents auditing courses are subject to all fees charged to students regis-d for credit.

PUS COURSES

student is permitted to complete registration or attend classes until all rges are paid. Tuition and fees for each semester are due and payable in at the Office of the Cashier at the time of each registration. Checks and al money orders should be made out to George Washington University.

he Student Accounts Office has responsibility for billing and maintaining ent accounts for tuition, various fees, and room and board charges. A stu-registered for 6 semester hours or more may sign a deferred payment tract with the Student Accounts Office at the time of each registration per-ing him to pay one-half of the total tuition and fees (except for fees pay-in advance) at the time of registration and the remaining half on or be-October 31, 1973 (for the fall semester), and March 6, 1974 (for the ng semester). Interest at the rate of 8 per cent per annum on the unpaid nce will be charged from the date of registration to the date payment is e. The University will not obligate itself to notify the student, in advance, he payment-due date for the second half of the semester charges.

tudents receiving tuition assistance in the form of scholarships, government on contracts, or other forms of tuition awards are not permitted to sign rred payment contracts unless the total tuition and fee charges exceed the e of the tuition awards by $525 or more. Under such circumstances the ent may be permitted to pay one-half of the amount due from the student

at the time of registration and to defer the balance by signing a deferred pay ment contract.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of 6 per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered the student forfeits his rights to the use of deferred payment contracts in fu ture semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registered for credit.

REFUND OF FEES FOR OFF-CAMPUS REGISTRATION*

Applications for withdrawal from the University or for change in class schedule must be made in person or in writing to the dean of the college, school, or division in which the student is registered. Notification to an instructor is not an acceptable notice.

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges will be made in accordance with the following schedule for the academic year (withdrawal dates for the Summer Sessions will be announced in the *Off-campus Summer Sessions Schedule of Classes*):

Session	*Per cent refund on or before the date listed*			
	90%	75%	50%	None
Fall Semester 1973				
Long Session (Sept. 10–Dec. 17)	Sept. 14	Sept. 28	Oct. 12	After Oct. 12
First Short Session (Sept. 10–Oct. 29)	Sept. 12	Sept. 19	Sept. 26	After Sept. 26
Second Short Session (Nov. 5–Dec. 21)	Nov. 7	Nov. 14	Nov. 21	After Nov. 21
Spring Semester 1974				
Long Session (Jan. 21–April 29)	Jan. 25	Feb. 8	Feb. 22	After Feb. 22
First Short Session (Jan. 21–March 6)	Jan. 23	Jan. 30	Feb. 6	After Feb. 6
Second Short Session (March 18–May 1)	March 20	March 27	April 3	After April 3

Students withdrawing from courses scheduled at times other than those listed above should consult the Student Accounts Office for information concerning refunds.

No exceptions will be made for holidays, late registration, absences, or class rescheduling for any reason whatsoever.

* For regulations concerning refunds of fees for students who register for courses on campus, see the *Undergraduate and Graduate Catalogue*, the *School of Engineering and Applied Science Catalogue*, or the *Summer Sessions Catalogue*.

student who is granted military leave before completing the semester will ive credits for current charges in accordance with the schedule for with- wals from the University (see page 30). Payments made in excess of the efundable balance will be refunded to the student. The nonrefundable ice will be maintained as a deferred credit for use by the student when he ns to the University (see "Military Leave," pages 36–37).

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o case will tuition be reduced or refunded because of absence from classes. yment applies only to the semester for which a registration charge is in- ed and will not be credited to another semester (exception: students granted ary leave, see pages 36–37).
uthorization to withdraw and certification for work done will not be given dent who does not have a clear financial record.

Regulations

PUS STUDY

CAMPUS DEGREE CANDIDATES may register for campus courses approved for programs if these courses are not available at off-campus centers. Stu- s must notify the Office of Student Records, College of General Studies, hone 676-7017, at least two weeks prior to the date of campus registra- so that a registration packet may be prepared. Packets may be picked up he student at Building C, Room 101, 2201 G Street, N.W., prior to and g registration.
student may register for on-campus courses as a nondegree student in the ion of University Students, telephone 676-6370.

DEMIC WORKLOAD

students admitted to degree candidacy may enroll as full-time students, for 12 or more hours in a semester. Students taking course work to qualify degree candidacy who are registered in this College may not take more 10 hours in a semester.
full-time undergraduate student who is not on probation may not ordi- y take more than 17 semester hours. A student employed more than 20 rs a week, who is not on probation, may not take more than 10 hours.
full-time undergraduate student who is a candidate for a degree in the ol of Government and Business Administration and whose quality-point x is 3.50 or higher may not take more than 18 hours. An employed under- duate student who meets the same standard may not take more than 12 rs.
full-time undergraduate student who is a candidate for a degree in Colum- College of Arts and Sciences and who, during the immediately preceding ester, has received no grades below *B* and has earned grades of *A* in three rses totaling at least 9 semester hours may take 18 or 19 hours. An loyed undergraduate student who, during the immediately preceding se- ter, has no grades below *B* and has earned grades of *A* in two courses ling at least 6 semester hours may not take more than 12 hours.
student on probation normally may not take more than 3 semester hours.

A student who accepts employment after registration or at any time during a semester must report that fact immediately to the Dean so that his program may be adjusted, if necessary.

A full-time graduate student who is a candidate for a degree in the School of Government and Business Administration may not take more than 12 semester hours. A graduate student who is employed more than 20 hours a week may not take more than 6 hours.

A full-time student in the Graduate School of Arts and Sciences registers for 9 to 12 semester hours each semester; a part-time student registers for a minimum of 6 semester hours each semester. These requirements do not apply when a student has fewer than 9 semester hours (full-time) or 6 semester hours (part-time) remaining to complete his program. No more than 15 semester hours may be taken during any one semester.

ATTENDANCE

A student may not attend classes until registration is completed and fees due are paid. He may attend only those classes for which he is registered.

In a thirteen-week course in which classes meet once a week, *one* unexcused absence is permitted. In a thirteen-week course in which classes meet twice a week, *two* unexcused absences are permitted. In a six and a half week course meeting twice a week, *one* unexcused absence is permitted. Minimum absences per se will not be used as the sole reason for failing a course. It is the University policy that students attend classes regularly.

Excuses must be made by written application to the instructor, or by verbal permission later confirmed in writing. The student is held responsible for all course work.

SCHOLARSHIP

GRADES

Grades are mailed to the student through the Office of the Registrar at the close of each semester. They are not given out by instructors or the administrative staff.

UNDERGRADUATE

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Satisfactory; *D*, Low Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal. Except for courses which specifically state that repetition for credit is permitted, a student may not repeat for credit a course in which he has received a grade of *D* or better, unless required to do so by the department concerned. A written statement to this effect must be submitted to the Registrar by the appropriate departmental chairman.

GRADUATE

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; *I*, Incomplete; *CR*, Credit; *W*, Authorized Withdrawal. Except for courses which specifically state that repetition for credit is permitted, a student taking School of Education and School of Government and Business Administration courses may not repeat for credit a course in which he has

eived a grade of *C* or above. A student taking a Graduate School of Arts d Sciences course may repeat for credit a course in which he has received rade of *C* or above only when permitted to do so by the department con- ned, unless the course description states that the course may be repeated credit. A written statement to this effect must be submitted for approval the Dean's Office. It is then filed with the Registrar. A student taking ool of Engineering and Applied Science courses may not repeat for credit ourse in which he has received a grade of *C* or above, unless required to do by the department concerned; a written statement requiring the student to eat such a course for credit must be submitted to the Registrar by the propriate department chairman.

OMPLETE/AUTHORIZED WITHDRAWAL

enever a grade has not been assigned, the symbol *I* (Incomplete) or the mbol *W* (Authorized Withdrawal) will be recorded. The symbol *I* indicates t a satisfactory explanation has been given the instructor for the student's ure to complete the required work of the course. At the option of the tructor, the grade of *I* may be recorded if a student, for reasons beyond his ntrol, is unable to complete the work of the course, and if the instructor is ormed of, and approves, such reasons before the date when grades must be orted. The grade may be used only if the student's prior performance and s attendance in the course have been satisfactory. Any failure to complete work of a course which is not satisfactorily explained to the instructor ore the date when grades must be turned in will be graded *F*. If acceptable sons are later presented to the instructor, he may initiate an appropriate de change.

MOVING AN INCOMPLETE

information concerning the removal of a grade of Incomplete from a stu- t's record, consult the regulations of the college or school (see pages 46, 62, 67, and 76.

ALITY-POINT INDEX*

ality points are computed from grades as follows:
For each semester hour of the letter grade—*A*, 4 points; *B*, 3 points; *C*, 2 nts; *D*, 1 point; *F*, no points.
Scholarship is computed in terms of the quality-point index. This is done by iding the total number of quality points by the total number of semester rs for which the student has registered. Example: if a student received an in one three-credit course, and a *B* in another three-credit course, he would mpute his quality-point index this way:

$$4 \times 3 \text{ (semester hours)} = 12$$
$$3 \times 3 \text{ (semester hours)} = 9$$
$$6 \qquad\qquad 21 \div 6 = 3.5 \text{ quality-point index}$$

Courses marked *W*, *I*, or *CR* are not considered in determining the index,

* applicable to Columbian College or Arts and Sciences and graduate study in the School of neering and Applied Science.

except that courses marked *I* will be considered when a formal grade is re-
corded. Grades in courses taken at other institutions are not considered in
computing the quality-point index.

WARNINGS

At stated intervals during the academic year students who are doing work of *D*
grade or lower in courses with departmental numbers below 100 receive
"warnings." A "warning" constitutes notice to the student that he must consult
his instructor and his adviser at the earliest opportunity. "Warning periods" are
established during the seventh and eighth weeks of thirteen-week courses, and
during the third and fourth weeks of six and a half week courses.

PROBATION

*Undergraduate Probation in the School of Government and Business Ad-
ministration.*—A student must maintain a quality-point index of at least 2.00
or be placed on probation.

A student who has attempted 12 or more semester hours of work and whose
cumulative quality-point index is between 1.50 and 2.00 is placed on probation
for the period in which he attempts 12 additional semester hours of work. If
his quality-point index is still below 2.00 at the end of his probationary period,
he is suspended.

Undergraduate Probation in Columbian College of Arts and Sciences.—A
student who is not suspended or on probation is considered to be in good
standing. A student* who in one semester receives two grades of *F* in courses
carrying 3 or more semester hours of credit each, or the equivalent, is placed
on probation. A student in his first semester on probation who receives one
grade of *F* in such a course will be continued on probation for a second semes-
ter. Two grades of *D* will be treated as equivalent to one grade of *F* in con-
sidering probation. A student on probation taking 12 or more semester hours
whose grades are all *C* or better is removed from probation.

*Graduate Probation in the School of Government and Business Administra-
tion.*—A student who has attempted 6 or more semester hours and whose qual-
ity-point index is below 3.00 is placed on probation for the period in which he
attempts 12 additional semester hours of work. If his quality-point index is
still below 3.00 at the end of his probationary period, he is suspended. If,
after probation is removed, a student's quality-point index again falls below
3.00, he is suspended.

SUSPENSION

*Undergraduate Suspension in the School of Government and Business Admin-
istration.*—A student who has attempted 12 or more semester hours of work
and whose cumulative quality-point index is below 1.50 is subject to suspension.

Undergraduate Suspension in Columbian College of Arts and Sciences.—A
student* who in one semester receives grades of *F* in three courses carrying 3
or more semester hours of credit each, or the equivalent, is suspended. A stu-

* The rules governing probation and suspension are applicable as stated to students enrolled for a full-time program (12 semester hours or more) during the fall or spring semester. Students enrolled for less than 12 semester hours during the fall or spring semester and students enrolled during the summer sessions are subject to probation or suspension on the basis of their record for 12 semester hours, or multiples thereof, rather than on their record in any one semester.

nt in his first semester on probation who receives two or more grades of *F* in ch courses is suspended. A student who receives one or more grades of *F* in ch courses in any later semester on probation is suspended. Two grades of will be treated as equivalent to one grade of *F* in considering suspension.

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n undergraduate student who is subject to probation for the third time, hether successive or after an interval, is suspended.

An undergraduate student suspended for poor scholarship cannot register for urses even as an auditor. He may apply for readmission after the lapse of ther the fall or the spring semester. He must then submit evidence to the ommittee on Scholarship that he is better qualified to pursue college work. A udent suspended twice for poor scholarship will not be readmitted.

Graduate Suspension in the School of Education.—A student who receives he grade of *C* in more than 6 semester hours of work is subject to suspension. student who receives a grade of *F* must confer with the Dean of the School f Education before enrollment for further work.

HANGES IN PROGRAM OF STUDIES

ROPPING A COURSE OFF CAMPUS

course may be dropped without academic penalty *during the first third of the emester.* Withdrawing from a course without academic penalty after the first hird of the semester requires approval of a written request, *accompanied by a ompleted drop slip,* addressed to the Dean of the College of General Studies.

Procedure for Dropping Courses.—An off-campus drop slip (obtainable from he instructor, or University representatives at the College of General Studies) ust be completed, signed and dated by the instructor, and submitted to the ollege of General Studies. The effective date will be the date the instructor gned the drop slip.

Failure to follow the proper procedure will result in the Office of the Regis- ar recording the grade of *F* and, regardless of the time of discontinuance, will ot relieve the student of financial responsibility for the entire course.

ROPPING A COURSE ON CAMPUS

campus drop slip (available at the Office of the Registrar) must be completed, igned and dated by the instructor, and submitted to the Office of Student Rec- rds, College of General Studies.

Each college and school of the University sets deadline dates for each semes- er concerning withdrawal.

All charges for courses dropped without the approval of the dean must be et by the student. Reporting the dropping of a course to an instructor does ot constitute an official withdrawal.

RANSFER WITHIN THE UNIVERSITY

ransfer of residence to the College of General Studies, as a degree candidate, rom another college, school, or division of the University may be made only ith the approval of the deans concerned. Applications for transfer are avail-

able at the University's Office of Admissions or at the office of the appropriate dean. Upon transfer the student should consult his faculty adviser as to the requirements he must fulfill.

A maximum of 42 semester hours is transferrable toward the Associate in Arts in General Studies degree; a maximum of 90 semester hours is transferrable toward a Bachelor's degree; a maximum of 12 semester hours is transferrable toward a Master of Science in Administration degree; and a maximum of 6 semester hours is transferrable toward the degree of Master of Arts in Special Studies, Master of Science in Forensic Science, or Master of Science in Special Studies. Students transferring within the University are advised to note the residence requirements of the degree sought.

CREDIT

Credit toward a degree is given only after registration for and satisfactory completion of the required work of courses in the University, or upon the granting of advanced standing in accordance with the regulations of the College.

For transfer from credit to audit status, see page 25.

BALANCE SHEET

On request, the Registrar will issue to undergraduate degree candidates a balance sheet showing the amount of work completed and the requirements remaining to be met for the degree. A second balance sheet will be issued only in the event the student changes major or degree objectives.

TRANSCRIPTS OF RECORD

Official transcripts of student records will be issued on request of the student or former student who has a clear financial record. A fee of two dollars is charged for each transcript.

CONTINUOUS REGISTRATION

Degree candidates are expected to maintain continuous registration until *all* degree requirements are satisfied (for "Leave of Absence" exception granted by the Graduate School of Arts and Sciences, see page 65). Students who have completed course registration (including the thesis) must maintain continuous registration by paying the "continuous registration" fee (see page 27). By failing to register for one semester or more, the student breaks his registration and must be readmitted (see "Readmission," page 24). A "Readmitted Student" is required to satisfy the curriculum requirements existing at the time of his readmission. The maintaining of continuous registration normally is limited to a period of one year.

Students must be registered during the summer if they are taking courses, are taking required examinations, are receiving guidance toward theses or dissertations, or are expecting to graduate at the end of the Summer Sessions.

MILITARY LEAVE

A student called to active duty may be granted military leave for the period of active duty, upon presentation to his dean of a copy of his orders and a petition for such leave. The maintenance of "continuous registration" is not required of

e student on military leave; however, he must apply for readmission to the iversity well in advance of the semester in which he expects to return. Pay- nts for tuition and fees which are not refunded to the student at the time he granted military leave will be maintained as a deferred credit for his account d use upon return to the University.

RADUATION REQUIREMENTS

be recommended for graduation a student must have met the admission re- irements of his college or school; completed satisfactorily the scholarship, cur- ulum, residence, and other requirements for the degree for which he is regis- ed; and be free from all indebtedness to the University. Registration, either r course work or on the "continuous registration" fee basis, is required for the mester or summer session immediately preceding the awarding of the degree. letter concerning degree completion is sent to military files upon request.

Application for Graduation.—An "Application for Graduation" form *must* be d and the appropriate fee paid at the time of registration for the last semester summer session of the senior or final year. Students completing degree re- irements during the Summer Sessions will be awarded diplomas (no formal nvocation) September 30, *provided* they have completed all degree require- nts and have applied for graduation as a part of registration for the Summer ssions.

Scholarship.—The student must meet the scholarship requirements for the rticular degree for which he is registered.

Curriculum.—See the requirements for the degree concerned.

Residence.—A student is "in residence" only when registered for course work er making application for admission to degree candidacy or for the 15 semes- r hours undertaken to qualify for degree candidacy (see the specific residence quirements for the degree concerned).

With the permission of the appropriate dean, a student may be granted leave absence; such student should, however, remain technically in residence by aying the continuous registration fee for each semester he is absent (for ex- ption granted by the Graduate School of Arts and Sciences, see page 65). or the purpose of this regulation, the summer session is disregarded.

Except for Master's degree candidates in the Graduate School of Arts and iences, the School of Education, and the School of Engineering and Ap- ied Science, service personnel who receive military transfers when they are ithin 6 hours of a degree may, by special arrangements, be permitted to com- ete their work elsewhere, transfer these credits to the College of General Stud- , and receive a degree from this University. This procedure does not apply to aster's candidates who have been granted 6 hours of transferred credit or ve not completed the required courses.

Attendance and Conduct.—The University reserves the right to refuse to nfer a degree upon a candidate whose attendance or conduct has been unsat- factory.

Thesis.*—A thesis, submitted in partial satisfaction of requirements for the aster's degree, must be submitted in its final form to the appropriate dean no er than the date specified in the calendar. Two complete copies of each

*Applicable only to programs in the School of Government and Business Administration. See es 76–77 for *Thesis* in the School of Engineering and Applied Science, page 62 for *Thesis* in e School of Education.

thesis are required. It is the responsibility of the candidate for a graduate degree to obtain from the College of General Studies a printed copy of the regulations governing the styling and reproduction of the thesis. These regulations are rigidly enforced (see page 67).

Accepted theses, with accompanying drawings, become the property of the University and are deposited in the University Library, where the duplicate copies are bound and made available for circulation.

Dissertation.—A dissertation, submitted in partial satisfaction of requirements for the Doctor of Science degree, must be submitted in its final form to the Dean of the School of Engineering and Applied Science no later than the date specified in the Calendar. It is the responsibility of the candidate to obtain a printed copy of the regulations governing the styling and reproduction of the dissertation (see page 79).

HONORS

Dean's List.—To be eligible for inclusion on the Dean's List, a student must be a candidate for an undergraduate degree. Course work taken while the application for admission is being processed will be computed in determining eligibility for the Dean's List. A full-time degree candidate in the School of Government and Business Administration programs must have a minimum quality-point index of 3.50 for the semester concerned; a part-time degree candidate must have a quality-point index of 3.50 on the last 12 semester hours of work and must have maintained continuous registration for at least one three-hour course during the period concerned. Eligibility for inclusion again will be determined on the basis of the subsequent 12 semester hours of work. In Columbian College of Arts and Sciences degree programs, a student must have received grades of *A* in at least 60 per cent of the last 15 semester hours of work and no grades of *D* or *F*.

With Distinction.—The undergraduate degrees may be conferred "With Distinction," at the discretion of the Dean's Council of the College and the Committee on Scholarship if a student meets the following qualifications: in the School of Government and Business Administration programs he must attain a quality-point index of 3.50 or higher on all work taken at this University, or in Columbian College of Arts and Sciences programs he must have received grades of *A* in at least 60 per cent of the courses taken at this University.

To be eligible for this honor a student must have completed at this University at least one-half of the course work required for the degree.

Special Honors.—Special Honors may be awarded to any member of the graduating class for outstanding achievement in the student's concentration of work on recommendation of the major department. The student must fulfill the following requirements:

1. The student must have candidacy for Special Honors approved by the faculty member representing the major department or concentration no later than the beginning of the senior year.

2. The student must meet such other conditions as may be set at the time candidacy is approved.

3. The student must have completed at this institution at least one-half of the courses required for the degree.

4. The student must fulfill the specific requirement of the college or school in which he is registered, as follows: (a) Columbian College of Arts and Sciences —attainment of the grades of *A* or *B* in 50 per cent of the courses taken at this

stitution; or (b) the School of Government and Business Administration—intain a quality-point index of at least 3.00 on all course work taken at this stitution.

SHONESTY

a student knowingly makes a false statement or conceals material informa-on on an application for admission, registration card, or any other University ocument, his registration may be cancelled. If such falsification is discovered fter the student has established an academic record at the University, he may e subject to dismissal from the University. Such a student will be ineligible except by special action of the Dean's Council) for subsequent registration n any unit of the University.

Academic dishonesty on the part of any student will result in a disciplinary rade of *F* for the course involved and also may, upon the recommendation f the Dean's Council, result in his suspension from the University for a stated eriod, at the end of which time he may petition for readmission. Upon ap-roval of the Dean's Council, the disciplinary grade of "Failure—Academic ishonesty" will be recorded for the course involved, and this grade will be mployed in the computation of the quality-point index or academic standing. student so suspended shall be withdrawn from all other courses except those which all work has been completed.

HE LIBRARY

student registered in the College of General Studies is entitled to the use of he University Library. A permit form for library privileges is issued to each tudent. A borrower's card may be obtained by presenting the permit form at he Circulation Desk of the Library.

The loan period for most books available for outside circulation is 30 days. fine of 25 cents is charged for each day a book is overdue. Any book which irculates is subject to recall by the Library if needed for reserve or other use. eserve books must be used in the reserve reading room when the Library is pen, except that they may be withdrawn for overnight use beginning at 8:30 m. A fine of 50 cents is charged for each hour or fraction thereof that a eserve book is overdue. Grades of a student are withheld until his library ecord is clear.

All students using the University Library are expected to be familiar with its etailed regulations, available on application to any of the Library's Service esks.

IGHT TO DISMISS STUDENTS

The right is reserved by the University to dismiss or exclude any student from he University, or from any class or classes, whenever, in the interest of the tudent or the University, the University Administration deems it advisable.

IGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right

to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

RECENTLY ESTABLISHED REGULATIONS

An Appendix (pages 180–82) contains regulations recently approved by the University's Board of Trustees.

UNIVERSITY POLICY ON RELEASE OF STUDENT INFORMATION

In general, the policy of the University is one of attempting to keep the student's record confidential and out of the hands of those who would use it for other than legitimate reasons. At the same time, the policy must be flexible enough not to hinder the student, the University, or the community in their legitimate endeavors.

No information concerning a student will be released except as noted below:

1. Information such as whether or not the student is currently enrolled; dates of attendance; verification of date and place of birth; degrees earned, if any, date, major field or area of concentration, and honors received; home and local addresses and telephone numbers; school, college, or division of enrollment, and class; verification of signature; name and address of parent or guardian.

2. The issuance of formal transcripts of record to recognized institutions of higher learning; the certification of academic achievement to the various recognized professional associations (law, medicine, engineering, education, etc.).

Additional information will be released only on written authorization from the student, or by court order or subpoena. If a subpoena is served, the student whose record is being subpoenaed will be notified and the subpoena will be referred to the University's legal counsel.

Government investigative agencies have no inherent right to access to student files and records. If expressly requested, properly identified representatives from federal, state, or local government agencies may be given the information listed under No. 1 above.

UNIVERSITY POLICY ON SELECTIVE SERVICE INFORMATION

The University notifies draft boards of a student's academic status only when the student requests or authorizes, in writing, that the draft board be notified. An undergraduate student desiring certification for the Selective Service System must go to the Registrar's Office and complete the Selective Service Information Card which authorizes the University to notify his draft board of his full-time enrollment. It is the student's obligation to complete this card if he wants his draft board to know that he is registered as a full-time student.

OR SOCIETIES

lpha Sigma Lambda.—A National honor society for part-time evening ge and off-campus undergraduate degree students, the purpose of which is cognize and to encourage scholarship and leadership among undergraduate ee candidates. Membership is limited to students who have been enrolled four semesters or terms in the College of General Studies and have com- ed 30 semester hours of work toward a degree with a 3.50 average, or ivalent. The Alpha Alpha Chapter was established at George Washington versity in 1965.

hi Beta Kappa.—Undergraduate degree candidates in the College of General dies programs are eligible for membership in Phi Beta Kappa, national olarship honorary society. The society recognizes "outstanding intellectual acity well employed" in the field of liberal arts and sciences. Senior and or students who are candidates for the degree of Bachelor of Arts, Bachelor Science, or Bachelor of General Studies in Columbian College, and who have wn broad cultural interests, distinguished scholarly achievement, high char- r, general promise, and scholarly ideals may, to a number not exceeding 15 r cent of a class, be elected to membership by the faculty members of the ta Chapter of the District of Columbia. Seniors and juniors in other ools of the University who meet the above requirements are also eligible for sideration for membership, provided that their program of studies includes eciable work in the liberal arts.

UNSELING

dents in the off-campus programs may obtain educational counseling and istance in program planning through the Office of Counseling and Informa- Services or from University representatives at the various off-campus centers. e Office of Counseling and Information Services coordinates student person- services, including academic counseling, vocational guidance as related to ucational programs, and liaison with other University departments and serv- s, as well as serving as a resource center for information on tuition assist- e available to students in the College of General Studies programs. Appoint- nts may be made by calling the College of General Studies, telephone 676- 69, or through the Education Director at locations where courses are sched- ed. University counselors are also available at all locations during announced gistration periods and at scheduled times each month.

IVERSITY BOOKSTORE

xtbooks may be ordered by mail from the University Bookstore. Forms for e purpose are available at registration. The hours of the Bookstore will be nounced in the *Schedule of Classes*.

The Bookstore is located in the Cloyd Heck Marvin Center, 800 21st Street, W.; telephone 676-6870.

VETERANS EDUCATION

The Office of the Registrar, Luther Rice Hall, 2121 Eye Street, N.W., assists students entitled to educational benefits as veterans or war orphans with any problems which may arise concerning their benefits. This Office also processes certifications of enrollment and attendance to the Veterans Administration so that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or war orphans should consult the Office of the Registrar prior to submitting application to the Veterans Administration. All such students should obtain the instruction sheet issued by the Office of the Registrar, which sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration, and which includes other information of general interest.

The Veterans Administration is at 2033 M Street, N.W., Washington, D.C. 20421.

STUDENT AND ALUMNI CAREER SERVICES OFFICE

The Student and Alumni Career Services Office, Woodhull House, 2033 G Street, N.W., provides assistance to degree-seeking students and alumni seeking full-time, part-time, temporary, or permanent employment.

Counseling concerning trends in employment, areas of employment, various test and examination announcements, preparation for job interviews, resume writing, and other procedures for successful job application are always available. Specific career openings; an on-campus recruitment program by business, industry, government, and school systems; volunteer opportunities; and part-time and temporary jobs for students while attending school are all part of the service. Referral and placement functions of the on-campus College Work-Study Program are handled by the Student and Alumni Career Services Office. Teacher credential files initiated by persons seeking employment in all educational fields are maintained in this Office.

An understanding and knowledgeable approach to avenues of service for those people who do not find career satisfaction in the structured systems of business, government, and education is also provided in the Student and Alumni Career Services Office.

Continuing Education for Women

MANY WOMEN wish to resume or continue their education on a part-time basis. They feel the need to return to the classroom to update their education, prepare for new careers, qualify for job promotion, participate more effectively in community affairs, or enrich their own lives through a sense of personal growth. The Continuing Education for Women program, which originated in 1964, is designed to meet these needs. More than 3,500 women have been assisted with their goals during a nine-year period.

Continuing Education for Women offers (1) *Developing New Horizons for Women,* and *Career Development for Employed Women;* (2) off-campus credit courses at hours and locations convenient for women; (3) selected noncredit courses; (4) academic counseling for women entering degree and nondegree

ams; and (5) a Legal Assistant Training Program. It also cooperates
usiness and government agencies in designing programs to meet needs
ployed women.

LOPING NEW HORIZONS FOR WOMEN

loping New Horizons for Women is offered each semester to help women
op their potential through understanding themselves as individuals and as
en; to gain confidence in their abilities; to become acquainted with educa-
l, occupational, and community service opportunities. There are no pre-
sites for this course. Participants range in age from 18 to 70 and in edu-
nal background from those with no previous college education to those
have earned graduate degrees. Approximately one-half have earned Bache-
degrees.

his 15-week noncredit course includes lectures, group discussions, guest
kers, psychological testing, and individual counseling. Participants attend
once a week for 2½ hours. This course has been held on campus as well
Alexandria, Arlington, and Reston, Va.; Bethesda, Rockville, Annapolis,
e, and Baltimore, Md. During the final 3 sessions of the class guest
ker sessions are held at the University campus. An evening class is also
eduled each semester, open to men and women.

EER DEVELOPMENT FOR EMPLOYED WOMEN

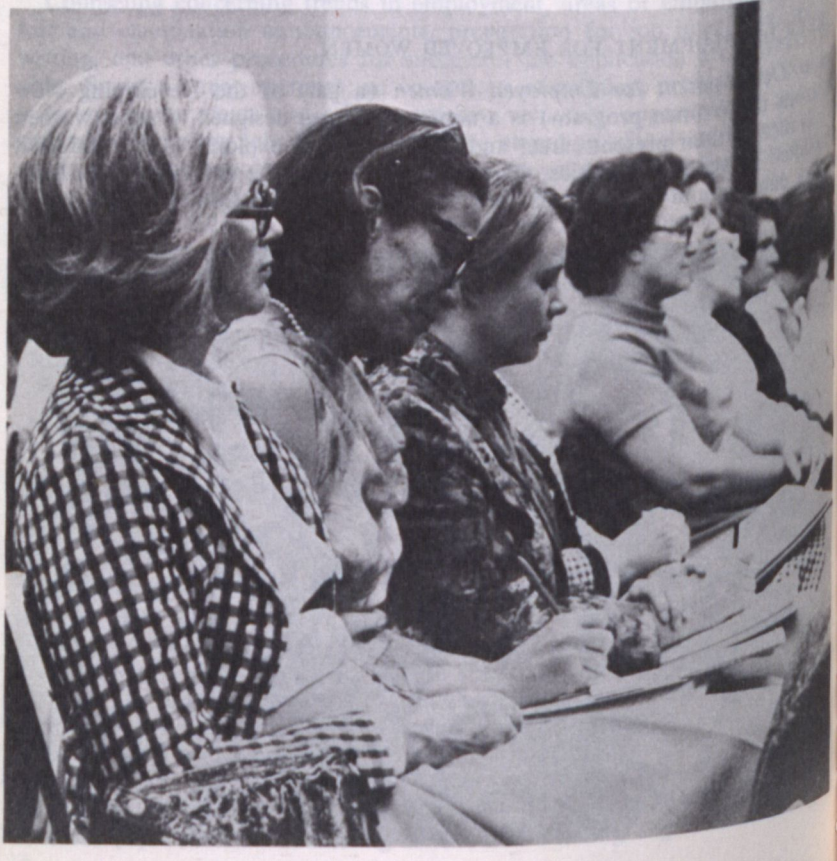
er Development for Employed Women (a part of the Developing New
izons for Women program) is a noncredit course designed to assist women
dvance in their present career and to help them to explore entirely different
lated career opportunities. The course is held in the evening on the Uni-
ity campus and at the Social Security Administration Center in Baltimore,

DAY-TIME OFF-CAMPUS CREDIT COURSES

To enable women to continue their formal education Continuing Education for Women offers credit courses off campus at hours and locations convenient for women. Classroom space has been provided by churches and community centers in Alexandria, Arlington, Annandale, Falls Church, McLean, and Springfield, Va.; Bethesda, Chevy Chase, Kensington, and Rockville, Md.; as well as the District of Columbia.

Except for Education courses, which meet for 3 hours a week, each course meets once a week for 2½ hours during the morning or early afternoon. Although many women take these courses to meet requirements for degree programs, students may also be accepted in a nondegree status. Many women who complete credit courses as nondegree students are encouraged to apply for degree candidacy at George Washington University. Other women need only specific courses to qualify for positions in business or government; some who already have degrees wish to qualify for professional certification in such fields as teaching or guidance. Many students in this program have had credits transferred to other colleges and universities throughout the country.

Increasingly, government and industry have been granting leave for employed women to enroll in daytime credit courses, particularly where the courses are job-related.



NONCREDIT COURSES

Selected noncredit courses are offered through Continuing Education for Women, taught by academically qualified instructors. Courses offered during 1972–1973 included *Foundations of Editorial Work; Introduction to Library Science; Writing and Illustrating Children's Books; Creative Thinking and Problem-Solving; Oral History Workshop; A Business of Your Own; How to Study; Mathematics Refresher; Employee Training and Supervision; Sex Discrimination and the Law; Painting and Sculpture of Spain;* and *The Feminine Mystique in Literature.*

LEGAL ASSISTANT TRAINING PROGRAM

During the fall of 1972, Continuing Education for Women, in cooperation with the George Washington University National Law Center, initiated the Legal Assistant Training Program. This one-year graduate-level academic Program prepares men and women to assist lawyers in research, writing, and other out-of-court functions. For admission to the Program, an applicant must have a Bachelor's degree or the equivalent in education or experience, and must successfully complete required tests. For a special brochure giving details of this Program, telephone 676-7036.

ACADEMIC COUNSELING

The professional staff of Continuing Education for Women counsels women interested in enrolling in off-campus degree and nondegree programs. Referrals are also made to colleges, schools, and departments of the University on campus, depending upon the goals of the individual student. Counselors are available at dates and locations indicated for registration. Appointments can also be made for individual or group counseling at the Office of Continuing Education for Women, 2130 H Street, N.W.

PROGRAM DEVELOPMENT

Nine years of experience in creating and conducting successful programs to meet needs of women has made the Staff of Continuing Education for Women uniquely qualified to design special programs for women in business or government.

The Continuing Education for Women program was originated for women. However, men are welcome to enroll in credit and noncredit courses. For further information telephone 676-7036 or write to Continuing Education for Women, George Washington University, 2130 H Street, N.W., Washington, D.C. 20006. Descriptive brochures are available.

DEGREE PROGRAMS

Undergraduate Degrees

THE FACULTY of Columbian College of Arts and Sciences has academic jurisdiction over the degrees of Associate in Arts in General Studies; Bachelor of General Studies with areas of concentration in history, mathematics, political science, and psychology; Bachelor of Science in Environmental Health; Bachelor of Science in Geodetic and Cartographic Science; and Bachelor of Science in Oceanography. The Faculty of the School of Government and Business Administration has academic jurisdiction over the degree of Bachelor of Science in Administration with areas of concentration in accounting and business administration. These off-campus programs are administered by the College of General Studies.

ADMISSION

For detailed information see "Admission as a Degree Candidate," page 18, and "Undergraduate Degree Candidacy," pages 18–21.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized Withdrawal) may be assigned are described on page 33.

Removing an Incomplete.—The grade of *I* must be removed no later than the last day of the examination period for the fall or spring semester immediately following the semester or summer session in which the grade of *I* is assigned. An "Incomplete" that is not removed within this period is automatically changed to an *F*. In cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the appropriate dean, or the appropriate committee, for additional time in which to complete the work of the course. Such petitions should be submitted within the same period. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere.

REQUIREMENTS FOR THE ASSOCIATE IN ARTS IN GENERAL STUDIES DEGREE

RESIDENCE

The last 18 semester hours in the Associate in Arts in General Studies degree program must be completed in residence as a candidate for this degree. A

portion of the academic work taken to qualify for degree candidacy (see page 39) may be accepted in partial satisfaction of the residence requirement, if the courses are approved as part of the student's degree program.

REQUIREMENTS FOR THE BACHELOR'S DEGREES

RESIDENCE

The last 30 semester hours, including at least 12 hours in the area of concentration, must be completed in residence as a candidate for the degree sought, unless special permission is granted by the appropriate dean to take work elsewhere. This requirement applies to students transferring within the University as well as to students transferring from other institutions. The 15 hours taken in order to be considered for degree candidacy may be counted in residence. For regulations governing military students who are transferred when they are within 6 semester hours of their degrees, see page 37.

Transfer students to the School of Government and Business Administration who have 90 semester hours of approved transfer credits from another college or university and who need only the 30-semester-hour minimum to complete degree requirements *must* plan their program of study with a faculty adviser before registering for the first course.

In no case will credit for more than 15 semester hours of undergraduate course work taken as a nonmatriculated student at this University be allowed toward meeting degree requirements without prior admission as a degree candidate for the Bachelor of Science in Administration program.

Transfers.—Transfer students from other colleges or universities must complete satisfactorily at least 12 semester hours of the required work in their area of concentration in residence as a candidate for the degree sought.

ASSOCIATE IN ARTS IN GENERAL STUDIES

Faculty Adviser: Edson G. Hammer, College of General Studies; Building F, Room 14, Telephone 676-7016.

Upon the satisfactory completion of the requirements set by Columbian College of Arts and Sciences, the degree of Associate in Arts in General Studies is conferred. Students who plan to continue working toward an off-campus Bachelor's degree offered by Columbian College must apply to the Dean upon completion of the requirements for the degree of Associate in Arts in General Studies. Forms for this purpose are available at the College of General Studies.

After completing the requirements for the degree of Associate in Arts in General Studies, students may wish to transfer to an on-campus degree program within the University, or they may wish to transfer to another institution. However, modifications in admission, advanced standing, and curriculum requirements permitted in the Associate in Arts in General Studies degree program may not be accepted in transfer. Therefore, while registered for this degree, students should meet the requirements of the college, school, or university to which they wish to transfer. The entrance requirements of the colleges and schools of the University are stated in this catalogue and in the *Undergraduate and Graduate Catalogue* of the University.

Scholarship.—The system of grading is described on pages 32–33. For regulations concerning probation, suspension, and readmission, see pages 34–35.

CURRICULUM

The satisfactory completion of 60 semester hours of college work in the following curriculum is required. Students who plan to pursue a Bachelor's degree are advised to plan their Associate's program so that they will satisfy the prerequisites to the degree of their choice.

	Semester Hours
Communications	
Engl 1 or 1x, 2	6
Sp&D 1 or 111 or 121	3
Humanities	
Nine semester hours selected from the following: Art 31–32, 71–72; Engl 43–44, 45–46, 51–52, 71–72, 91–92; Mus 3, 4; Phil 50; Rel 9, 10, 59–60	9
Natural and Mathematical Sciences	
Nine semester hours selected from the following: B Sc 3–4, 11–12; Chem 3–4; Geol 1–2, 3, 4; Math 3, 6, 9, 10, 30, 31, 51, 52; Ocea 101–2; Phys 1, 2, 9–10; Stat 51, 101–2	9
Social Studies	
Nine semester hours are required, each course chosen from one of two departments, selected from the following: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40, 71–72; P Sc 4 or 5, 6; Psyc 1, 8, 22, 29; Soc 1, 2	9
Elective (Mgt 118 and 119 recommended)	24
Total	60

BACHELOR OF GENERAL STUDIES

Faculty Adviser: Edson G. Hammer, College of General Studies; Building F, Room 14, Telephone 676-7016.

The Bachelor of General Studies curriculum aims to provide the adult part-time student with the opportunity to obtain a broad education. For that reason the course work required in the first and second years is distributed among Communications (written and oral), the Humanities, Natural and Mathematical Sciences, and the Social Studies. In choosing the third- and fourth-year course work required in departments related to their concentration, students should obtain counseling through the faculty adviser.

Students planning to work toward Master's degrees are advised to plan their Bachelor's programs so that they will meet the prerequisite requirements of the school or college of their choice. Students planning to enter graduate programs which require a reading knowledge of a foreign language are advised to include two years of one foreign language in their Bachelor's program.

Scholarship.—To remain in good standing and to qualify for graduation, a student must attain grades of *A* or *B* in at least half of the minimum number of semester hours of 100-level (or above) course work required in the selected area of concentration.

The system of grading is described on pages 32–33. For regulations concerning probation, suspension, and readmission, see pages 34–35.

FIRST AND SECOND YEARS

	Semester Hours
Communications	
Engl 1 or 1*x*, 2	6
Engl 11; Sp&D 111 or 121	6
Humanities*	
Twelve semester hours selected from the following: Art 31–32, 71–72; Engl 43–44, 45–46, 51–52, 71–72, 91–92; Foreign Language (2 years of one language); Mus 3 and 4; Phil 50; Rel 9 and 10, 59–60; Slav 91–92	12
Natural and Mathematical Sciences	
Six to eight semester hours selected from the following: B Sc 3–4, 11–12; Chem 3–4; Geol 1–2, or 3 and 4; Ocea 101–2; Phys 1 and 2, or 9–10	6–8
Six semester hours selected from the following: Math 3, 6, 9, 10, 30, 31, 51, 52; Stat 51, 53, 101–2	6
Social Studies	
Twelve semester hours selected from two of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40; Hist 71–72; P Sc 4 and 6; P Sc 5 and 6; Psyc 1 and 8; Psyc 1 and 22; Psyc 1 and 53; Soc 1 and 2	12
Elective (depending on science option)	10–12
	60

THIRD AND FOURTH YEARS

Concentrations are offered in History, Mathematics, Political Science, and Psychology.

Concentration Requirements (to be selected in consultation with the faculty adviser):

100-level courses in the department of the selected area of concentration	24†
100-level courses in two or more related departments	18†
Elective	18
Total	120

*Students who plan to continue study for advanced degrees are urged to fulfill the 2-year language requirement.

†Students selecting psychology as an area of concentration are required to take 18 semester hours of 100-level Psychology courses and 24 semester hours of 100-level courses in two or more related departments.

BACHELOR OF SCIENCE IN ADMINISTRATION

Academic Advising: Information and Advising Center, Government 105, Telephone 676-7027

The Bachelor of Science in Administration curriculum aims to provide the adult part-time student with the opportunity to obtain a broad education and preparation for careers in accounting or business administration. Students should obtain both general educational counseling and specific area of concentration advising when initially considering their curriculum. A conference concerning curriculum planning for courses to be taken as a degree candidate is *required* of each applicant *before* admission to degree candidacy. The course work required in the first and second years is a general curriculum for both the Accounting and Business Administration concentration. The course work required for the third and fourth years is chosen from either the Accounting or Business Administration area of concentration curriculum. In choosing the third- and fourth-year course work required in departments related to their concentration, students should obtain counseling through the appropriate departmental faculty adviser. Except for Acct 115, 121, and 191, no student may receive credit for courses in Accounting and Business Administration numbered *above the 100-level* unless third-year (junior) standing has been attained. Also, an exception is made for those 100-level courses (B Ad 102, 105, and Mgt 118) specifically approved by the School of Government and Business Administration which are taken in the program of study leading to the degree of Associate in Arts in General Studies. The course work for all four years is described on the following pages.

Students are reminded that Accounting and Business Administration courses taken at accredited 2-year colleges may be applied toward the degree of Bachelor of Science in Administration provided they are comparable to below 100-level courses required in the first and second years of the curriculum.

Students planning to work toward Master's degrees are advised to plan their Bachelor's programs so that they will meet the entrance requirements of the school or college of their choice.

SCHOLARSHIP

The system of grading and computing scholarship is described in detail on pages 32–33. For regulations concerning probation, suspension, and readmission, see pages 34–35.

To remain in good standing and to qualify for graduation, a student must maintain a general quality-point index of 2.00 and a quality-point index of at least 2.50 in his area of concentration.

ACCOUNTING AND BUSINESS ADMINISTRATION CURRICULUM

FIRST YEAR	Semester Hours
Accounting	3–6
Acct 1–2* or 115	

* Students selecting Accounting as an area of concentration should elect Acct 1–2.

	Semester Hours
lish Composition	
ngl 1 or 1*x*, 2	6
nce	
x to eight semester hours selected in consultation with the adviser from e following: B Sc 3–4; Geog 51 and 52; Geol 1–2, or 3 and 4; Phys and 2, or 3 and 4, or 9–10	6–8
al Studies	
on 1–2	6
tive (to be selected in consultation with the adviser from courses other an those in Accounting, Business Administration, and Economics)	4–9
	30

ND YEAR

ness Administration

Ad 51 — 3

Literature, Language, Music, and Philosophy*

semester hours selected in consultation with the adviser from the following: Art 31; Engl 43–44, 45–46, 51–52, 71–72, 91–92; Foreign Language (1 full year of a foreign language); Mus 3; Phil 50 — 6

ematics

Math 31 and 32, or 51 and 52 — 6

l Studies

c 1, 8 — 6

semester hours selected in consultation with the adviser from the following: Anth 1; Hist 71–72; P Sc 4 or 5, 6; Soc 1 — 6

tics

t 51 or 101 — 3

30

UNTING CONCENTRATION CURRICULUM

D YEAR

Acct 101:	Cost and Budgetary Control	3
Acct 121:	Intermediate Accounting	3
Acct 161:	Federal Income Taxation	3
Acct 191:	Advanced Accounting	3
Ad 102:	Fundamentals of Management	3
Ad 131:	Business Finance	3

nts selecting Accounting as an area of concentration may postpone this 6-hour requirement e third year if they wish to elect Acct 121 and 191 in the second year.
31 and 32 are recommended for those students who plan to take graduate work in quan- methods.

		Semester Hours
B Ad 141:	Basic Marketing Management	3
B Ad 161:	Commercial Law: Contracts, Sales, Agency, Bailments	3
Mgt 119:	Computer Programming for Information Systems	3
Elective:	(Three semester hours selected in consultation with the adviser from 100-level courses in Accounting, Business Administration, or Economics)	3
		30

FOURTH YEAR

Acct 132:	Accounting Theory	3
Acct 171:	Auditing	3
Acct 181:	Accounting Systems	3
B Ad 101:	The Business Environment	3
B Ad 181:	Manufacturing Production	3
B Ad 198:	Business Policy and Administration	3
Econ 121:	Money and Banking	3
Stat:	Three semester hours selected in consultation with the adviser from the following	3
Stat 111:	Business and Economic Statistics I	
Stat 155:	Introduction to Probability	
Stat 187:	Theory of Sampling	
Elective:	(Three semester hours selected in consultation with the adviser from 100-level courses in Accounting, Business Administration, or Economics)	3
Elective:	(Three semester hours selected in consultation with the adviser from 100-level courses)	3
	Total semester hours	120

BUSINESS ADMINISTRATION CONCENTRATION CURRICULUM

THIRD YEAR

		Semester Hours
Acct 193:	Business Budgeting	3
B Ad 102:	Fundamentals of Management	3
B Ad 105:	Personnel Management	3
B Ad 131:	Business Finance	3
B Ad 141:	Basic Marketing Management	3
Mgt 118:	Introduction to Information Processing	3
Elective:	(Six semester hours selected in consultation with the adviser from 100-level courses in Accounting, Business Administration, or Economics)	6
Elective:	(Six semester hours selected in consultation with the adviser from 100-level courses)	6
		30

FOURTH YEAR

B Ad 101:	The Business Environment	3
B Ad 161:	Commercial Law: Contracts, Sales, Agency, Bailments	3
B Ad 181:	Manufacturing Production	3
B Ad 198:	Business Policy and Administration	3
Econ 121:	Money and Banking	3
Psyc 144:	Personnel and Industrial Psychology	3

		Semester Hours
Elective:	(Six semester hours selected in consultation with the adviser from 100-level courses in Accounting, Business Administration, or Economics)	6
Elective:	(Six semester hours selected in consultation with the adviser from 100-level courses)	6
	Total semester hours	120

BACHELOR OF SCIENCE IN ENVIRONMENTAL HEALTH

ty Advisers: First two years—Edson G. Hammer, College of General Studies; ng F, Room 15A, Telephone 676-7016. Third and fourth years—Jack W. r, Vivian Gill Professor of Epidemiology and Environmental Health, Ross Hall, hone 331-6117.

Bachelor of Science in Environmental Health curriculum is designed to de students with the requisite training to function effectively as Environ- l Health Officers in domestic and foreign areas. Candidates are prepared rticipation in community or regional program planning, community edu- , staff personnel training, and supervision in official or voluntary health zations.

rance requirements are stated on pages 18–21; residence requirements on 7.

determination of acceptability of a student to the program leading to the of Bachelor of Science in Environmental Health will be made by the advisers appointed by the Department of Epidemiology and Environ- Health and Columbian College of Arts and Sciences. The decision to a student must be unanimous. The degree is granted by Columbian e of Arts and Sciences and is administered by the College of General .

larship.—To remain in good standing and to qualify for graduation, a must attain grades of *B* or better in 13 semester hours of 100-level work taken in the major area of concentration.

system of grading is described on pages 32–33. For regulations con- probation, suspension, and readmission, see pages 34–35.

ND SECOND YEARS

nications

	Semester Hours
1 or 1x, 2	6
11; Sp&D 111 or 121	6

ties

e semester hours selected from the following: Art 31–32, 71–72; 3–44, 45–46, 51–52, 71–72, 91–92; Foreign Language (2 years of one ge); Phil 50 12

Natural and Mathematical Sciences

B Sc 11–12, Chem 11–12
Six semester hours selected from the following: Math 3, 6, 9, 10, 30, 31, 51, 52; Stat 51, 101–2

Social Studies

Six semester hours selected from one of the following combinations: Anth 1–2; Econ 1–2; Psyc 1 and 8; Psyc 1 and 22; or Soc 1 and 2

*Elective (Epid 1, 2, and 3 recommended)

THIRD AND FOURTH YEARS

Concentration Requirements (to be selected, in consultation with the adviser, from the following Epidemiology and Environmental Health courses)....

Environmental Sanitation—Epid 101, 102, 103, 104
Public Health Epidemiology—Epid 121, 122, 123, 131
Public Health Entomology—Epid 141, 142, 143, 144
Public Health Microbiology—Epid 151, 152, 153, 154
Occupational Health—Epid 171, 172
Public Health Administration—Epid 191, 192

Elective

100-level courses in two or more related departments in consultation with the faculty adviser, selected from Anthropology, Biological Sciences, Chemistry, Geology, Psychology, and Sociology

Total

BACHELOR OF SCIENCE IN GEODETIC AND CARTOGRAPHIC SCIENCE

Faculty Adviser: Hyman Orlin, Professorial Lecturer in Geodetic and Cartographic Science; Telephone 946-3557. Counseling by appointment only, Telephone 676-701

The course work in this four-year curriculum is offered on and off campus. The Cartography, Geodesy, Geophysics, and Oceanography courses are given at the National Oceanic and Atmospheric Administration, the Naval Oceanographic Office, the U.S. Army Topographic Command, and at other locations not too distant from the campus.

Entrance requirements are stated on pages 18–21; residence requirements are stated on page 47.

ADVANCED STANDING

For advanced standing information, see pages 19–21. *Note that no credit will be given for correspondence courses.*

* Electives selected with the approval of the adviser.

OLARSHIP

e system of grading is described on pages 32–33. For regulations regarding ration, suspension, and readmission, see pages 34–35.
o remain in good standing and to qualify for graduation, a student must ntain grades of *B* or better in half of the courses taken in one of the two s of concentration: (1) *Cartography*—Cart 103, 104, 111, 112, Geod 110, op 105; (2) *Geodesy*—Geod 110, 155, 156, 160, 161, Geop 105.

RICULUM

	Required—First Year	Semester Hours
Cart 1–2:	Introduction to Cartography	6
Engl 1:	English Composition: Language as Communication	3
Engl 2:	English Composition: Language and the Arts and Sciences	3
Math 30:	Precalculus	3
Math 31:	Calculus of One Variable	3
Phys 1:	General Physics	4
Phys 2:	Introduction to Modern Physics	4
ocial Studies:	To be selected from the following	6
AmCv 71–72:	Introduction to American Civilization	
Anth 1–2:	Introductory Anthropology	
Econ 1–2:	Principles of Economics	
Geog 51:	Introduction to Geography	
Geog 52:	Introduction to Economic Geography	
Hist 39–40:	European Civilization in Its World Context	
P Sc 4 or 5, 6	Introduction to Political Science	
Soc 1:	Introductory Sociology	
Soc 2:	American Social Problems	
		32

	Required—Second Year	
Cart 107:	Physiography	3
Chem 11–12:	General Chemistry	8
Engl 51–52:	Introduction to English Literature, or	
Engl 71–72:	Introduction to American Literature	6
Geod 12:	Plane Surveying	3
Geod 13:	Geodetic Surveying	3
Geol 1 or 3:	Introductory Geology	3
Math 32:	Calculus of Several Variables	3
Math 33:	Calculus of Vector Functions	3
		32

	Required—Third Year	
Geod 17:	Elementary Photogrammetry	3
Geod 18:	Intermediate Photogrammetry	3
Geod 110:	Map Projections	3
Geop 105:	Elementary Geophysics	3
Ocea 101–2:	Elementary Oceanography	3
Other Courses:	Six semester hours to be selected from the following	6
Art 31–32:	Survey of Western Art	6
Art 71–72:	Introduction to the Arts in America	
Mus 3:	Introduction to Musical Understanding	

		Semester Hours
Mus 4:	Survey of Music Literature	
Phil 50:	Introduction to Philosophy	
Rel 9:	The Old Testament	
Rel 10:	The New Testament	
Rel 21:	Introduction to Religious Thought	
Rel 59–60:	History of Religions	6
Elective:	(Selected in consultation with the adviser)	
		30

Areas of Concentration

Two areas of concentration are open to students in this program; students select one at the beginning of the fourth year.

Required—Fourth Year

CARTOGRAPHY CONCENTRATION		6
Cart 103–4:	Photo Interpretation	3
Cart 111:	Cartographic Techniques	3
Cart 112:	Advanced Cartography	
Elective:	(Courses in Cartography, Geodesy, Geophysics, and Oceanography selected in consultation with the adviser)	14
	Total	120

GEODESY CONCENTRATION		3
Geod 155:	Elementary Geodesy	3
Geod 156:	Geodetic Astronomy	3
Geod 160:	Mathematics of Adjustments and Least Squares	3
Geod 161:	Adjustments in Geodesy and Photogrammetry	
Elective:	(Courses in Cartography, Geodesy, Geophysics, and Oceanography selected in consultation with the adviser)	14
	Total	120

BACHELOR OF SCIENCE IN OCEANOGRAPHY

Faculty Adviser: Hyman Orlin, Professorial Lecturer in Geodetic and Cartographic Science; Telephone 946-3557. Counseling by appointment only, Telephone 676-7013.

The course work in this four-year curriculum is offered on and off campus. The Cartography, Geodesy, Geophysics, and Oceanography courses are given at the National Oceanic and Atmospheric Administration, the Naval Oceanographic Office, the U.S. Army Topographic Command, and at other locations not too distant from the campus.

Entrance requirements are stated on pages 18–21; residence requirements are stated on page 47.

ADVANCED STANDING

For advanced standing information, see pages 19–21. *Note that no credit will be given for correspondence courses.*

CHOLARSHIP

he system of grading is described on pages 32–33. For regulations concern- g probation, suspension, and readmission, see pages 34–35.

To remain in good standing and to qualify for graduation, a student must ain grades of *B* or better in at least 9 semester hours of course work in the llowing: Geop 105; Ocea 101–2; and 9 semester hours selected from Ocea 0, 111, 112, 113, 114, 115.

RRICULUM

	Required—First Year	Semester Hours
Cart 1–2:	Introduction to Cartography	6
Engl 1:	English Composition: Language as Communication	3
Engl 2:	English Composition: Language and the Arts and Sciences	3
Math 30:	Precalculus	3
Math 31:	Calculus of One Variable	3
Phys 1:	General Physics	4
Phys 2:	Introduction to Modern Physics	4
Social Studies:	To be selected from the following	6
AmCv 71–72:	Introduction to American Civilization	
Anth 1–2:	Introductory Anthropology	
Econ 1–2:	Principles of Economics	
Geog 51:	Introduction to Geography	
Geog 52:	Introduction to Economic Geography	
Hist 39–40:	European Civilization in Its World Context	
P Sc 4 or 5, 6:	Introduction to Political Science	
Soc 1:	Introductory Sociology	
Soc 2:	American Social Problems	
		32

	Required—Second Year	
B Sc 11–12:	Introduction to Biology for Science Majors	8
Engl 51–52:	Introduction to English Literature, or	
Engl 71–72:	Introduction to American Literature	6
Geol 1 or 3:	Introductory Geology	3
Geol 2 or 4:	Introductory Geology	3
Math 32:	Calculus of Several Variables	3
Math 33:	Calculus of Vector Functions	3
Ocea 101–2:	Elementary Oceanography	6
		32

	Required—Third and Fourth Years	
Cart 107:	Physiography	3
Cart 108:	Climatology	3
Chem 11–12:	General Chemistry	8
Geop 105:	Elementary Geophysics	3
eanography:	To be selected from the following	15
Ocea 11:	Navigation	
Ocea 110:	Physical Oceanography	
Ocea 111:	Ocean Waves and Tides	
Ocea 112:	Biological Oceanography	
Ocea 113:	Marine Geophysics	

		Semester Hours
Ocea 114:	Chemical Oceanography	
Ocea 115:	Geological Oceanography	
Other Courses:	(Courses in Biological Sciences, Chemistry, Geology, Geophysics, Oceanography, and Physics, selected in consultation with the adviser)	18
Elective:	To be selected from the following	6
Art 31–32:	Survey of Western Art	
Art 71–72:	Introduction to the Arts in America	
Mus 3:	Introduction to Musical Understanding	
Mus 4:	Survey of Music Literature	
Phil 50:	Introduction to Philosophy	
Rel 9:	The Old Testament	
Rel 10:	The New Testament	
Rel 21:	Introduction to Religious Thought	
Rel 59–60:	History of Religions	
	Total	120

SPECIAL DEGREE PROGRAMS

SERVICEMEN'S OPPORTUNITY COLLEGE (SOC)

George Washington University has been designated a Servicemen's Opportunity College (SOC). SOC provides opportunities for servicemen to pursue educational program goals through courses offered on base, in the evenings, on weekends, and at other nontraditional time frames. In support of the concept, George Washington University, while still maintaining its normal academic standards, assumes the responsibilities of meeting the educational needs of an individual serving in the Armed Forces. Provisions have been established whereby these individual needs can be met. Specifically, individuals designated as SOC students who desire to obtain an Associate's or a Bachelor's degree from George Washington University's Columbian College of Arts and Sciences will be assured of a degree completion program through use of the agreement that follows:

AGREEMENT

George Washington University, a Servicemen's Opportunity College, agrees to the following:

I. Upon admission to Associate in Arts in General Studies or Bachelor of General Studies degree candidacy, the student may take the required course work either on or off campus. Regardless of where taken, courses of study taken while a degree candidate may be applied toward the degree sought, as a requirement or an approved elective. Although the grade of *D* is not acceptable for transfer, it may be used to satisfy a curriculum requirement. It may not, however, be counted toward the total number of semester hours required for the degree, and it should not be repeated. Courses will be taken from George Washington University unless the serviceman is transferred to a location not served by this University. In the case of transfer and in consideration of the student's future assignment, arrangements will be made between

e student and the counselor assigned to him by the College of General Stud-
s to ensure that the courses he takes elsewhere satisfy his George Washington
niversity program.

II. Academic credit may be obtained by any one or a combination of the
llowing:

A. Registration as an on- or off-campus, full- or part-time student at this
niversity.

B. Advanced standing for academic studies taken at other accredited insti-
ions where such studies meet the requirements for the degree, or by examina-
n. (A maximum of 42 semester hours allowed for the Associate's degree; a
ximum of 90 semester hours allowed for the Bachelor's degree.)

Within the maximum of 42 hours of credit allowed for advanced standing, a
ximum of 30 hours may be obtained toward the Associate in Arts in General
udies degree by any one or combination of the methods below. Within the
ximum of 90 hours of credit allowed for advanced standing, a maximum of
hours may be obtained toward the Bachelor of General Studies degree by
y one or any combination of the following methods.

1. *College-Level Examination Program (CLEP) Subject Examinations.*—
LEP Subject Examinations are offered in 29 subject areas. These tests meas-
achievement in the equivalent of specific college-level courses. (Credit
y not be earned by passing the examination after having taken the equivalent

course.) Maximum credit allowed for Associate's degree, 30 semester hours; maximum allowed for Bachelor's degree, 60 semester hours.

2. *College-Level Examination (CLEP) General Examination.*—CLEP General Examinations are designed for students whose post-secondary education has been unorthodox. Therefore, a student who was regularly enrolled in a post-secondary program of education within three years of graduation is normally ineligible for credit through CLEP General Examinations. The General Examinations are offered in five areas: Mathematics; Social Sciences; Humanities; Natural Sciences; and English Composition. Duplicate credit is not permitted. (Credit—advanced standing—is not given for the General Test in English Composition.) Maximum credit allowed, 24 semester hours.

3. *Columbian College of Arts and Sciences Special Department Examinations.*—A student may request any department of Columbian College to offer him a special examination covering the subject matter of any specific course. (If an appropriate CLEP Subject Examination is available, the department may choose to employ it.) If a student performs satisfactorily, he may receive credit (advanced standing), waiver of requirement, or both, at the discretion of the department. Special departmental examinations will normally be of at least three hours' duration. A fee of $25 for each course examination is charged for preparing, administering, and grading. Maximum credit allowed for Associate's degree, 30 semester hours; maximum allowed for Bachelor's degree, 60 semester hours.

4. *Service Schools.*—A maximum of 30 (or a maximum of 12 hours if the courses are "professional") semester hours may be obtained on the basis of service schools satisfactorily completed, as evaluated in accordance with the "Guide to the Evaluation of Educational Experience in the Armed Forces," issued by the Committee on Accreditation of Service Experience. Ordinarily such subjects are counted as electives. No credit will be allowed for military experience as such.

5. *Correspondence Courses.*—A maximum of 15 semester hours may be earned through the successful completion of correspondence courses of college level which are offered by the U.S. Armed Forces Institute or a regionally accredited college or university.

III. The minimum requirement for the Associate in Arts in General Studies degree is 60 semester hours; the minimum requirement for the Bachelor of General Studies degree is 120 semester hours. A minimum of 18 semester hours for the Associate's degree and a minimum of 30 hours for the Bachelor's degree must be completed at George Washington University, but may be completed at any point in the student's program of study. At least 6 semester hours in the selected area of concentration must be taken at this University.

IV. The College of General Studies will handle and coordinate administrative matters and be the point of contact with the college granting the degree. The provisions as stated in the *College of General Studies* catalogue will apply in all cases not specifically mentioned in this agreement.

V. Tuition and fees will be as stipulated in the *College of General Studies* catalogue on a year-to-year basis.

VI. Students accepted under this program are subject to the probation and suspension regulations of the University, and are required to maintain scholastic standards.

VII. In addition to trained counselors, University Representatives are assigned to each installation to assist in the counseling function.

MASTER OF ARTS

E DEGREE OF MASTER OF ARTS with a field in Religion and Medical Care is new degree program offered by the Graduate School of Arts and Sciences der the direction of the Department of Religion. Although certain courses this program are offered only through the College of General Studies' off-mpus centers, candidates for this degree must register as a campus degree ndidate in the Graduate School of Arts and Sciences.

The program of study is interdisciplinary and combines both professional d academic work. The intent of the program is (1) to provide training in academic graduate milieu of chaplains and clergymen whose professional ectiveness might be increased through the combination of clinical experience d academic study; (2) to provide a program of study for those medical stu-nts who have a sense of the significance of theological insights for the care the whole man and who desire to combine their medical education with correlative study; and (3) to provide a program of research and study in e area of religion and medical care for those whose theological training (e.g., ethics or sociology of religion) and interest are directed toward a vocation teaching. Support for the program comes from (1) Clinical Training pro-ms of the National Naval Medical Center, National Institutes of Health, d Walter Reed General Hospital; and (2) the departments of Health Care dministration, Psychology, Religion, Sociology, and departments of the hool of Medicine and Health Sciences.

The program of study leading to the degree of Master of Arts in the field Religion and Medical Care consists of 36 semester hours of approved course rk with or without a thesis and the passing of a Master's Comprehensive amination.

For information concerning admission requirements and the specific require-nts for the degree, contact the Graduate School of Arts and Sciences or the hairman of the Department of Religion.

MASTER OF ARTS IN EDUCATION

e School of Education has academic jurisdiction over the degree of Master Arts in Education. This off-campus degree program is designed for educa-rs who wish to increase their knowledge of professional and academic infor-tion and to prepare for special types of educational service.

The Master of Arts in Education degree programs offered at off-campus nters are available in the following fields: elementary administration; ele-ntary education; higher education; human resource development; secondary ministration; secondary education; special education—crisis/resource teach-g, diagnostic-prescriptive teaching, early childhood special education; and pervision and human relations.

MISSION

r detailed information see "Admission as a Degree Candidate," page 18, and ges 21–22.

REQUIREMENTS FOR THE DEGREE

The program of study consists of a minimum of 33 or 36 semester hours of course work, depending upon the chosen field. The thesis (equivalent to 6 semester hours) is optional.

RESIDENCE

Advanced standing is granted for approved courses taken at other accredited institutions; however, a minimum of 30 semester hours must be completed at this University, with no less than 21 semester hours completed after admission to Master's degree candidacy.

SCHOLARSHIP

A quality-point index of 3.00 is required for graduation. Students who receive a grade of *C* in more than two courses are subject to suspension. Students who receive a grade of *F* must confer with the Dean of the School of Education before enrollment for further work.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized Withdrawal) may be assigned are described on page 33.

Removing an Incomplete.—Although the grade of *I may* remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work (usually the final examination or a required paper) must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An "Incomplete" cannot be made up after the lapse of one calendar year except by written permission of the Dean's Council. An "Incomplete" which is not removed within one calendar year is automatically changed to an *F*.

THE THESIS

Students who elect a thesis must register on campus for Educ 299–300. The choice of the thesis subject must be approved in writing by the student's adviser and filed in the Office of the Dean. A statement of the School of Education standards for the thesis and printed copies of detailed regulations regarding the form and reproduction of the thesis are available in the Office of the Dean.

Payment of tuition for the thesis entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, an additional calendar year may be granted without further tuition payment. The student must, however, maintain continuous registration (see page 27) during this period. If the preparation of the thesis extends beyond the additional calendar year, the student must register for the entire 6 hours of thesis again and pay tuition as for a repeated course.

MASTER'S COMPREHENSIVE EXAMINATION

In addition to the course examinations, the candidate must pass a special three-hour examination on his area of specialization. Candidates for the examination

ust be registered for the semester it is to be taken, and must file a written pplication in the Office of the School of Education no later than thirty days rior to the date of the examination.

MASTER OF ARTS IN SPECIAL STUDIES AND MASTER OF SCIENCE IN SPECIAL STUDIES

e Graduate School of Arts and Sciences has academic jurisdiction over the grees of Master of Arts in Special Studies and Master of Science in Special udies. These degree programs provide a course of study appropriate to those udents who wish to emphasize interdisciplinary work. They are offered both f and on campus. The programs off campus can only be offered for a group f students with mutual educational goals. The programs allow a maximum flexibility; however, they must be developed around identified objectives and ust provide a structured sequence of study toward these goals. University presentatives will work with interested groups to develop suitable programs. he contemplated curriculum must be approved prior to admission to the raduate School. A student interested in interdisciplinary work leading to one f these degrees who is not in a group program must register on campus.

For information on Special Studies programs currently available in off-mpus programs, see "Special Degree Programs," pages 81–82.

For detailed information on the regulations for the off-campus degrees, see e *Handbook for Off-campus Students,* available at the Office of the Dean of he Graduate School of Arts and Sciences.

DMISSION

or detailed information, see "Admission as a Degree Candidate," page 18, and ge 22.

QUIREMENTS FOR THE DEGREES

he program of study consists of 36 semester hours of course work including plurality of courses in the arts and sciences (e.g., economics, natural sciences, olitical science, psychology, sociology, statistics), with not more than one-ird from any single department. *There are no thesis or tool requirements.* dvanced undergraduate courses (those numbered 101–200) may be included the program of study upon the approval of the Graduate School and with e provision that students complete additional work for graduate credit.

Each program of study must be approved by the Dean of the Graduate hool of Arts and Sciences and the departmental advisers.

SIDENCE

minimum of 30 semester hours must be completed after admission to Mas-r's degree candidacy.

HOLARSHIP

raduate students are expected to maintain a minimum accumulative grade erage of *B* (3.00) in all course work in the program of studies. Individual partments may require a higher average.

In the case of a student who receives a grade of *F* for a course in his program of studies, the Graduate School will require a departmentally approved written statement justifying the student's continuance in the Graduate School and outlining the program to be followed. Continuation is contingent upon the Dean's approval. A course in the program of studies for which an *F* is received cannot be subsequently removed from the program even though another course is taken as a substitute.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) and *W* (Authorized Withdrawal) may be assigned are described on page 33.

Removing an Incomplete.—An "Incomplete" must be made up before the lapse of one calendar year. An "Incomplete" which is not removed within one calendar year remains as a grade of *I* on the student's record. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere.

MASTER'S COMPREHENSIVE EXAMINATION

Master's degree candidates must pass a Master's Comprehensive Examination administered by the Graduate School of Arts and Sciences on campus on specified dates (see Calendar).

A student who fails to pass the Master's Comprehensive Examination may, in exceptional circumstances, and with the approval of the department and the Dean, repeat the Examination at the next scheduled date. If he fails a second time, no further opportunity to take the Examination is permitted.

ITHDRAWAL

raduate students who intend to withdraw from the Graduate School of Arts d Sciences should inform the School in writing. The last day for complete ithdrawal without academic penalty is at the end of the eighth week of asses.

AVE OF ABSENCE

a student is temporarily unable to continue his program of studies, he may quest leave of absence for a specific period of time, not to exceed one cal-dar year. When the period of leave has expired, it is the student's respon-ility to notify the Graduate School at least two months in advance of a en registration period of his intention to reregister. If he fails to reregister, candidacy will be terminated.

MASTER OF SCIENCE IN ADMINISTRATION

e School of Government and Business Administration has academic juris-ction over the degree of Master of Science in Administration. This degree ogram provides a course of study appropriate for those students currently rking in government or industry. It is a professional degree, preparing aduates for positions of higher and broader responsibility and generally proving their competence as administrators. Students expecting to continue a doctoral program should consult the Committee on Doctoral Studies in the hool of Government and Business Administration concerning necessary erequisites. Students will usually find it advantageous to consult with the mmittee early in planning their Master's degree programs.

The University cannot guarantee that all courses in this curriculum will be fered at every off-campus center. However, any student who has been ad-tted to degree candidacy may arrange to complete his curriculum by regis-ring on campus. *Campus registration is limited to 12 semester hours of the r 18 hours of the degree program.* Only students with Bachelor's degrees ay register for courses numbered above the 200 level in the School of Gov-rnment and Business Administration.

JECTIVES OF THE SCHOOL OF GOVERNMENT AND SINESS ADMINISTRATION

e principal objective of the School of Government and Business Administra-n is to prepare its graduates for positions in the management of complex or-nizations in both business and government. The degree programs are de-ned to prepare students both for *entrance* into business and government and *advancement* to high-level management positions.

Programs in the School include examination of administrative principles and antitative approaches to decision-making common to both business and gov-rnment. These programs stress the points at which major policy decisions of her business or government must give consideration to related policy deci-ons of the other. Emphasis is placed on the fact that management education not limited to organizational techniques but is, in the broadest sense, educa-n for management responsibility.

It is the policy of the School to emphasize a broad fundamental education as the best preparation for positions carrying management or administrative responsibility.

The degree of Master of Science in Administration develops the elements common to all management positions regardless of the nature of the operation. This degree program is based on the study of the principles of management, human relations, and problem-solving plus an area of specialization.

In order to provide students with a common body of knowledge of business or governmental administration, programs include the equivalent of at least one year of work comprising the following areas:

1. In the case of business enterprise, a background of the concepts, processes, and institutions in marketing and distribution, production, and financing functions; in the case of governmental administration, a background of concepts, processes, and institutions of planning, programming, budgeting, personnel practices, and policy formulation in government.
2. A background of the economic and legal environment of business and government enterprise, along with consideration of the social and political influences on business.
3. A basic understanding of the concepts and methods of accounting or budgeting, quantitative methods, and information systems.
4. A study of organization theory, interpersonal relationships, control and motivation systems, and communications.
5. A study of administrative processes under conditions of uncertainty, including the integration of analysis and policy determination at the over-all management level.

ADMISSION

For detailed information see "Admission as a Degree Candidate," page 18, and page 22.

REQUIREMENTS FOR THE DEGREE

RESIDENCE

A minimum of 30 semester hours of graduate work must be completed while registered as a degree candidate in this off-campus program.

The thesis and thesis seminar (6 semester hours) may be included in the 30 hours of course work taken in residence. A graduate student who transfers from another division of the University is required to have a minimum of 12 hours of course work as a degree candidate in this off-campus program.

SCHOLARSHIP

An average of *B* or better is required for the Master's degree. The grade of *C* is not considered as failing but must be counter-balanced by a grade of *A* in a graduate course of equal status. A Master's degree candidate who receives a grade of *F* in a course required in his program of study is required to present cause for consideration by the Dean's Council of the School of Government and Business Administration as to why he should be allowed to continue his studies toward a degree objective. A student whose scholarship is unsatisfactory may be suspended.

COMPLETE/AUTHORIZED WITHDRAWAL

onditions under which the grades of *I* (Incomplete) and *W* (Authorized With-awal) may be assigned are described on page 33.

Removing an Incomplete.—The grade of *I* must be removed no later than e last day of the examination period for the fall or spring semester immedi-ely following the semester or summer session in which the grade of *I* is as-gned. An "Incomplete" that is not removed within this period is automatically anged to an *F*. In cases of well-documented extenuating circumstances, an structor and a student may jointly petition the Dean, or the appropriate com-ittee, for additional time in which to complete the work of the course. Such etitions should be submitted within the same period. The grade of *I* cannot e removed by reregistering for the course here, or by taking its equivalent ewhere.

HESIS

ith the approval of the adviser, a thesis may be substituted for 6 semester ours of course work.

The thesis subject and the thesis in its final form must be approved by the rector of the thesis and the faculty adviser and presented to the Dean no later an the date announced in the calendar. Printed copies of detailed regulations garding the form and reproduction of the thesis are available at the Office Counseling and Information Services, College of General Studies.

Payment of tuition for the thesis entitles the candidate, during the two mesters he registers for thesis (299–300), to the advice and direction of the ember of the faculty under whom the thesis is to be written. In case a thesis unfinished, an additional successive academic year is granted without further ition payment. The student must, however, maintain continuous registration ring this period. If the preparation of the thesis extends more than three mesters beyond the date the student registers for thesis 300, he must register r the entire 6 hours of thesis again and pay tuition as for a repeated course.

URSE SUBSTITUTION

is the responsibility of the student to get written approval from the faculty viser prior to registration for any course substitution. Forms for requesting bstitution are available at the Office of Counseling and Information Services, llege of General Studies.

ASTER'S COMPREHENSIVE EXAMINATION

he Master's candidate is required to pass a written Master's Comprehensive amination. Before applying for the Examination, the student must have mpleted or be registered for all of the courses in his program, and he must ve maintained a 3.00 *(B)* average. If a student has completed all course ork, continuous registration must be maintained, and the continuous registra-on fee paid, until the Examination is taken, except for the Summer Sessions the student does not intend to take the Examination at that time. *After plying for the Examination, a candidate may withdraw only by notice in iting to the appropriate department chairman. Failure to take the Examina-on without an official withdrawal constitutes a failure for the Examination.* writing the Examination, the student is expected to correlate what he has

learned in his course work and his reading in the literature of the field. The Examinations are conducted at the University in December for students graduating in February, in April for students graduating in May, and in July for students graduating in September.

A candidate who fails the Examination may, in exceptional circumstances and with specific approval of his advisers, repeat the Examination, but only after the lapse of one semester and the undertaking of additional preparation as prescribed. *If he fails a second time, no further opportunity to take the Examination will be permitted.*

REQUIRED COURSES

		Semester Hours
B Ad 202:	Relations of Government to Business	3
*†Econ 220:	Survey of Principles and Issues in Economics	3
Mgt 201:	Advanced Administrative Management	3
‡Mgt 204:	Quantitative Factors in Administration	3
Mgt 207:	Human Behavior in Organizations	3
§Mgt 240:	Survey of Information Technology	3
		15–18
Area of Concentration:		12–18
†Elective:	To be selected with the approval of the adviser	0–6
	Total	36

AREAS OF CONCENTRATION

I. BEHAVIORAL SCIENCES IN ORGANIZATIONAL DEVELOPMENT

Faculty Advisers: Eric K. Winslow, Associate Professor of Behavioral Sciences, Government 201, Telephone 676-7375; Jerry Harvey, Associate Professor of Management Science, Building Y, Room 10, 2131 G Street, N.W., Telephone 676-6205.

This area of concentration reflects the assumption that the effective utilization of the behavioral sciences is concerned with both means and ends; that the specialist in behavioral science not only is skilled in theory and research but also applies his technical and specialized knowledge as a conscious force in effective organizational growth and improvement. Thus, courses are designed to equip the student with organizational concepts and behavioral skills appropriate to optimizing the utilization of a system's total resources.

This program is designed to fulfill the need for professionals capable of designing, creating, and developing the necessary behavioral and organizational systems appropriate to rapidly changing societies. Emphasis is on the interrelationships of such dimensions as motivation, leadership, problem-solving, organizational growth, and increased complexity of modern organizations and their effect upon the function of organizational development.

* Not required in Business Management area of concentration.
† Econ 217 and 218 may be used to satisfy the Econ 220 requirement and 3 semester hours of elective.
‡ Mgt 204 is waived for students electing Business Financial Management, Management Science—Operations Research, or Systems Management as an area of concentration.
§ Students in the Information Technology area of concentration should substitute Mgt 224.

		Semester Hours
*Mgt 208:	Current Issues in Organizational Behavior	3
*Mgt 210:	Behavioral Factors in the Process of Change	3
*Mgt 212:	Organizational Development: Concepts and Methods	3
Mgt 224:	Theory and Management of Systems	3
*Mgt 262:	Seminar: Contemporary Administrative Theory	3
Other Courses:	To be selected from the following as approved by the adviser	3
B Ad 211:	Leadership and Executive Development	
Mgt 213:	Consultative Processes in Organizations	
Mgt 230:	Administration of Research and Development	
P Ad 223:	Behavioral Factors in Large Organizations	
P Ad 233:	Seminar: Manpower Development and Utilization	
	Total	18

BUSINESS FINANCIAL MANAGEMENT†

culty Adviser: Rodney W. Eldridge, Associate Professor of International Finance; overnment 405, Telephone 676-6892.

his area of concentration provides a background in business budgeting, con-llership, treasury, long-range planning, reporting, and financial management ocesses. Courses are designed to emphasize the planning, analysis, implemen-tion, and controls necessary for making effective financial decisions.

		Semester Hours
Acct 215:	Survey of Managerial Accounting	3
B Ad 231:	Financial Decision-making	3
B Ad 232:	Capital Resource Management	3
B Ad 233:	International Business Finance	3
B Ad 237:	Investment Analysis	3
‡Mgt 225:	Managerial Statistics I	3
	Total	18

BUSINESS MANAGEMENT

culty Adviser: To be announced.

his area of concentration, with its prerequisites, provides the essentials of busi-ss administration with emphasis upon managing the finance, production, mar-ting, and accounting functions of a business firm. These functions are inte-rated in a final course using actual business cases.

Nine semester hours in Mathematics; 6 semester hours in Economics (not in-luding Econ 220); and 3 semester hours each in Accounting, Business Admin-tration, and Statistics are prerequisite to the Business Management area of oncentration.

		Semester Hours
Acct 215:	Survey of Managerial Accounting	3
B Ad 225:	Seminar: Manufacturing Production	3

fered only on campus.
Mgt 204 *Quantitative Factors in Administration* is waived in this area of concentration.
Mgt 203 *Mathematics for Management* or the equivalent is prerequisite for this course.

		Semester Hours
B Ad 231:	Financial Decision-making	3
B Ad 241:	Marketing Management	3
B Ad 297:	Business Policy Formulation	3
	Total	15

IV. GOVERNMENTAL ADMINISTRATION

Faculty Advisers: David S. Brown, Professor of Management, Government 302, Telephone 676-6295; Stephen R. Chitwood, Associate Professor of Public Administration, Government 310, Telephone 676-6064.

This area of concentration emphasizes policy formulation and administration in government. It provides the broad dimensions of public administration for those preparing for managerial responsibility in the public service.

		Semester Hours
P Ad 213:	Administration in Government	3
P Ad 231:	Public Personnel Administration	3
P Ad 251:	Governmental Budgeting	3
P Ad 252:	Problems in Planning, Programming, and Budgeting	3
P Ad 260:	Seminar: Policy Formulation and Administration	3
	Total	15

V. INDUSTRIAL PERSONNEL MANAGEMENT

Faculty Adviser: Joe L. Jessup, Professor of Business Administration; Government 400, Telephone 676-6068.

This area of concentration provides a basic academic and professional foundation, equipping the student for administrative responsibility in industrial personnel management. The courses cover the fields of personnel management, industrial relations, unionism, collective bargaining, labor relations, and manpower development and utilization.

		Semester Hours
B Ad 208:	Personnel Management and Industrial Relations	3
B Ad 209:	Seminar: Personnel Management	3
B Ad 212:	Unionism and Collective Bargaining	3
B Ad 213:	Current Issues in Unionism, Collective Bargaining, and Labor Relations	3
P Ad 233:	Seminar: Manpower Development and Utilization	3
	Total	15

VI. INFORMATION TECHNOLOGY

Faculty Adviser: John F. McCarthy, Jr., Associate Professor of Business Administration; Government 409, Telephone 676-7089.

This area of concentration provides a managerial understanding of the principles of manual, mechanical, and electronic information processing, including computer programming concepts, methods, and languages; an appreciation of the capabilities, limitations, and selection procedure of information processing equipment; a knowledge of all phases of management information systems de-

lopment, implementation, and evaluation; and an understanding of the roles both management and systems personnel in information technology. It also ovides an appreciation of the role of information technology as a tool of manement.

Students actually participate in the development of management information tems; in the selection of computer equipment; and in the installation, manement, and evaluation of management information systems.

		Semester Hours
Mgt 241:	Management Information Systems Development and Application	3
Mgt 242:	Comparative Computer Systems	3
Mgt 243:	Management of Information Technology	3
Mgt 249:	Seminar: Information Technology	3
	Total	12

. INTERNATIONAL COMMERCE

culty Adviser: Geza P. Lauter, Associate Professor of Business Administration; overnment 404, Telephone 676-7374.

is area of concentration prepares students for careers in firms operating on a ltinational basis or about to enter the international field; for careers in the deral government and in international agencies concerned with business, instry, and finance abroad; and for the commerce option of the Foreign Serv- Officer Examination.

		Semester Hours
B Ad 233:	International Business Finance	3
B Ad 248:	International Marketing	3
B Ad 255:	International Business in Perspective	3
B Ad 256:	Seminar: International Trade	3
B Ad 257:	Operation of the Multinational Firm	3
	Total	15

II. MANAGEMENT ENGINEERING

culty Adviser: Jack W. Waldrip, Assistant Professor of Business Administration; ilding Y, Room 21, 2131 G Street, N.W., Telephone 676-7139.

is area of concentration provides a background for industrial management. urses cover organization and functioning of industrial firms, and the manement practice and problems of such firms.

		Semester Hours
B Ad 225:	Seminar: Manufacturing Production	3
B Ad 280:	Procurement and Contracting	3
B Ad 297:	Business Policy Formulation	3
Mgt 224:	Theory and Management of Systems	3
Mgt 230:	Administration of Research and Development	3
	Total	15

IX. MANAGEMENT SCIENCE–OPERATIONS RESEARCH*

Faculty Adviser: William W. Hardgrave, Associate Professor of Management Science; Building Y, Room 20, 2131 G Street, N.W., Telephone 676-6852.

This area of concentration develops an understanding of quantitative approaches to problems of managerial control and decision-making. While the program will develop a competent background in basic mathematical theory associated with the various techniques, it is oriented towards applications of the techniques rather than their theoretical mathematical content.

		Semester Hours
†Mgt 225:	Managerial Statistics I	3
Mgt 226:	Managerial Statistics II	3
Mgt 227:	Mathematical Programming: Techniques and Applications	3
Mgt 228:	Techniques of Operations Research	3
Mgt 229:	Seminar: Management Science and Operations Research	3
Other courses:	To be selected from the following as approved by the adviser	6
B Ad 225:	Seminar: Manufacturing Production	
Mgt 224:	Theory and Management of Systems	
Mgt 242:	Comparative Computer Systems	
	Total	21

X. MANAGERIAL ACCOUNTING

Faculty Adviser: Anthony J. Mastro, Professor of Accounting; Government 302, Telephone 676-6055.

This area of concentration provides a knowledge of interrelated systems of accounting in planning and control for management. Emphasis is on the requirements of management for accounting information with concern for general and corporate accounting principles to the extent related to the managerial accounting functions.

Acct 115 *Survey of Financial Accounting* or the equivalent is prerequisite to the Managerial Accounting area of concentration.

		Semester Hours
‡Acct 215:	Survey of Managerial Accounting	3
Acct 262:	Business Income Taxation	3
Acct 276:	Management Planning and Control	3
Acct 295:	Seminar in Accounting	3
B Ad 231:	Financial Decision-making	3
	Total	15

XI. PROCUREMENT AND CONTRACTING

Faculty Adviser: Stanley N. Sherman, Assistant Professor of Business Administration; Government 312, Telephone 676-7462.

This area of concentration provides a basic academic and professional founda-

* Mgt 204 *Quantitative Factors in Administration* is waived in this area of concentration.

† Mgt 203 *Mathematics for Management* or the equivalent is prerequisite for this course.

‡ If Acct 215 or an equivalent course has been taken prior to entrance into this program, students may substitute Acct 275 or 282.

, equipping the student for administrative responsibility in procurement and tracting. The courses cover industrial purchasing, procurement activities of federal government, and contracting activities of vendors to the federal ernment.

		Semester Hours
B Ad 279:	Purchasing and Materials Management	3
B Ad 280:	Procurement and Contracting	3
B Ad 282:	Government Contract Administration	3
B Ad 283:	Pricing and Negotiation	3
B Ad 285:	Systems Procurement and Project Management	3
	Total	15

PUBLIC FINANCIAL MANAGEMENT AND BUDGETING

ulty *Adviser:* Stephen R. Chitwood, Associate Professor of Public Administra- Government 310, Telephone 676-6064.

area of concentration provides a broad foundation for work in govern- tal planning, programming, budgeting; and for controllership and related ncial management activities. Its main stress is on financial processes and sion-making in the public service.

		Semester Hours
Acct 215:	Survey of Managerial Accounting	3
P Ad 213:	Administration in Government	3
P Ad 251:	Governmental Budgeting	3
P Ad 252:	Problems in Planning, Programming, and Budgeting	3
	Total	12

PUBLIC PERSONNEL MANAGEMENT

ulty *Adviser:* To be announced.

area of concentration provides a basic academic and professional founda- equipping the student for administrative responsibility in public personnel agement. The courses cover the federal administrative organization and ess; principles, functions, and problems of personnel administration in the lic service; unionism and collective bargaining; and manpower development utilization.

		Semester Hours
B Ad 212:	Unionism and Collective Bargaining	3
P Ad 213:	Administration in Government	3
P Ad 231:	Public Personnel Administration	3
P Ad 232:	Problems in Public Personnel Management	3
P Ad 233:	Seminar: Manpower Development and Utilization	3
	Total	15

RESEARCH AND DEVELOPMENT MANAGEMENT

ulty *Adviser:* Daniel D. Roman, Professor of Management Science; Government Telephone 676-6678.

area of concentration provides a basic academic and professional founda-

tion, equipping the student for responsibility in research and development management. The courses cover technological change and manpower, public policy toward science and technology, government contract administration, and the administration of research and development.

		Semester Hours
B Ad 282:	Government Contract Administration	3
Mgt 230:	Administration of Research and Development	3
P Ad 235:	Technological Change and Manpower	3
P Ad 262:	Seminar: Science, Technology, and Public Policy	3
Other Courses:	To be selected from the following as approved by the adviser	6
B Ad 225:	Seminar: Manufacturing Production	
B Ad 285:	Systems Procurement and Project Management	
Mgt 203:	Mathematics for Management	
*Mgt 225:	Managerial Statistics I	
Mgt 226:	Managerial Statistics II	
	Total	18

XV. SYSTEMS MANAGEMENT†

Faculty Adviser: Walton E. Smith, Associate Professor of Management Science; Building Y, Room 22, 2131 G Street, N.W., Telephone 676-7159.

This area of concentration provides a basic academic and professional foundation, equipping the student for administrative responsibility in computer-based systems. The courses cover computers, data processing, operations research, and the theory and management of systems.

		Semester Hours
‡Mgt 203:	Mathematics for Management	3
Mgt 224:	Theory and Management of Systems	3
Mgt 225:	Managerial Statistics I	3
Mgt 242:	Comparative Computer Systems	3
Mgt 243:	Management of Information Technology	3
	Total	15

ELECTIVES

Unless a student elects to write a thesis, he may select electives appropriate to his program from graduate courses offered by the School of Government and Business Administration. To choose electives from the courses offered by the School of Government and Business Administration or to choose them from other related departmental offerings in this University, the student must obtain the written approval of the faculty adviser prior to registration. A form for this purpose may be obtained from the Office of Counseling and Information Services, College of General Studies.

* Mgt 203 *Mathematics for Management* or the equivalent is prerequisite for this course.
† Mgt 204 *Quantitative Factors in Administration* is waived in this area of concentration.
‡ Students who are proficient in calculus must substitute an appropriate elective course which has been approved by the adviser. Graduate credit will not be given for this course if a student has undergraduate credit for a calculus course.

MASTER OF SCIENCE

School of Engineering and Applied Science in cooperation with the Na-
al Aeronautics and Space Administration's Langley Research Center, Hamp-
Virginia, has a graduate engineering program at NASA-Langley. NASA-
gley's extensive scientific and engineering facilities and equipment are avail-
to students in this program.

he programs at NASA-Langley lead to the degrees of Master of Science and
special permission of the appropriate department chairman) Doctor of
nce in the fields of acoustics, aerospace engineering, computer-aided struc-
l design, flight sciences, fluid mechanics, solid mechanics and materials en-
ering, thermal sciences, electrical engineering, and computer science. These
grams are open to qualified NASA employees and area residents. With the
roval of the instructor, courses may be taken in nondegree status.

he School of Engineering and Applied Science in cooperation with the
al Ship Research and Development Center, Annapolis, Maryland, has a
duate engineering program leading to the degree of Master of Science in
s of materials science and systems science. The programs are open to
ified NSRDC employees and area residents.

he School of Engineering and Applied Science in cooperation with the
al Ship Research and Development Center, Carderock, Maryland, has a
duate engineering program leading to the degree of Master of Science in the
of ocean and marine engineering. The program is open to qualified
RDC employees and area residents.

he School of Engineering and Applied Science has academic jurisdiction
these degree programs which are administered by the College of General
ies.

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detailed information see "Admission as a Degree Candidate," page 18, and
s 22–23.

UIREMENTS FOR THE DEGREE

minimum program consists of 24 semester hours of approved graduate
ses and a Master's thesis (equivalent to 6 semester hours). The student
elect an optional program without a thesis which consists of a minimum
3 semester hours of approved graduate courses. All Master's candidates
required to pass a Master's Comprehensive Examination. Students whose
ergraduate study does not include necessary prerequisites may be required
ake more than the minimum semester hours required.

pon admission the student is assigned an adviser. Programs of study are
rmined by any prerequisites established and the requirements of the depart-
t in which the student wishes to study. The program of studies in prepara-
for the Master's Comprehensive Examination must be approved by the
ent's adviser and the appropriate department chairman.

OLARSHIP

Master's work, a minimum of 24 semester hours (for those who receive
it for a thesis) or 33 semester hours (for those who follow the optional pro-

gram without a thesis) of graduate course work with the grade of *B* or higher is required for graduation. Students who receive two grades of *F*, or three grades below *B*, are barred from further enrollment in graduate courses and, ordinarily, will not be readmitted to graduate study. Students who receive the grade of *C* in one or two courses are required to take additional course work to make up the minimum semester hours of work with grades of *B*.

INCOMPLETE AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) and *W* (Authorized Withdrawal) may be assigned are described on page 33.

Removing an Incomplete.—Although the grade of *I may* remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An "Incomplete" which is not removed within one calendar year is automatically changed to an *F*.

RESIDENCE

In general, a minimum of one year of full-time study, or the equivalent in part-time study, must be completed in the School of Engineering and Applied Science.

MASTER'S THESIS

In those programs requiring a thesis, the degree candidate must submit an acceptable thesis to demonstrate his ability to make independent use of the knowledge and discipline of thought acquired and developed by graduate study, to furnish objective evidence of constructive power in a given field, and to demonstrate that he can communicate the results of his work in writing. Work of a suitable character for which the student has professional responsibility may be considered, whether done on or off campus, provided no significant amount of work is completed without faculty supervision.

As a part of registration for the thesis course 299, the candidate must submit to the appropriate department chairman (on the form obtainable at the School office) his thesis area, approved by his faculty adviser. He must submit his thesis title to the Dean, on the form available in the School office, at the beginning of the semester in which he expects to graduate. Registration in thesis 299–300 entitles the student, during such registration, to the advice of the member of the faculty under whom the thesis is to be written. He may consult his adviser, but the thesis is the exclusive responsibility of the student.

The thesis in final form must be submitted to the appropriate department chairman by the date stated in the calendar for the semester in which the candidate enrolls in thesis 300. In case a thesis is unfinished on the date specified, the student will be granted an additional semester and must pay the "Continuous Registration" fee (see page 27) unless he is registered for course work. If the preparation of the thesis extends beyond the three semesters, approval for an extension of time will be required and the student must reregister for thesis 300 and pay tuition as for a repeated course.

A thesis may be submitted in final form one time. The acceptability of the thesis is determined exclusively by the Master's Comprehensive Examination

mittee. If the thesis is unacceptable, the student's graduate status is termi-
d.

inted copies of detailed regulations regarding the form and reproduction of
hesis are available in the Office of the School. Accepted theses, with ac-
panying drawings, become the property of the University and are deposited
e University Library, where the duplicate copies are bound and made
able for circulation.

ONAL MASTER'S PROGRAM WITHOUT A THESIS

student may elect an optional program without a thesis which consists of a
mum of 33 semester hours of approved graduate courses.

TER'S COMPREHENSIVE EXAMINATION

completing his prescribed program, the candidate must pass a Master's
prehensive Examination, to demonstrate substantial understanding of prin-
s and method and their use in the area of his interest. This Examination
be written, oral, or both. A graduate student who fails any portion of the
er's Comprehensive Examination on his first attempt may be examined one
time if approval is given by the appropriate Examining Committee. In
vent of failure to complete the Examination satisfactorily, the student's
uate status terminates.

TIME TO COMPLETE MASTER'S DEGREE REQUIREMENTS

A full-time Master's candidate is allowed a maximum of three calendar years to complete all degree requirements, from the date of his first graduate-student status registration in prerequisite or graduate courses. A part-time Master's candidate is allowed a maximum of five calendar years. The time limit does not include any period of registration as an unclassified student before admission to graduate student status, nor does it encompass any specified period spent on approved leave of absence. Readmission is required upon expiration of leave of absence under the conditions and requirements then prevailing.

Students who do not complete degree requirements within the allowed time have their graduate status terminated. They may be readmitted to graduate status under conditions specified by the department chairman and approved by the Dean.

MASTER OF ENGINEERING ADMINISTRATION

The School of Engineering and Applied Science in cooperation with the Naval Section, Prince Georges Center Building, Maryland, the Naval Research Laboratory, Washington, District of Columbia, and the Naval Ordnance Station, Indianhead, Maryland, is in the developmental stage of offering a graduate program leading to the degree of Master of Engineering Administration. The program will be open to employees of these organizations and area residents.

The School of Engineering and Applied Science has academic jurisdiction over this degree program which is administered by the College of General Studies.

ADMISSION

For detailed information see "Admission as a Degree Candidate," page 18, and pages 22–23.

REQUIREMENTS FOR THE DEGREE

The requirements for the degree of Master of Engineering Administration are the same as those listed under the degree of Master of Science (see pages 75–78).

DOCTOR OF SCIENCE*

The Doctor of Science degree program offered by the School of Engineering and Applied Science is designed to prepare the student for a career of creative scholarship by providing a broad, balanced background of knowledge and guidance in the performance of research. It requires study of interrelated fields of learning as well as original research in the field of central interest. The doctoral program for each student is determined, on an individual basis, by the student and his adviser. Work for the doctoral degree must be done in residence on campus except when special permission is granted by the chairman of the department for a student to be admitted for study to the program at the GWU—NASA-Langley Graduate Program at Hampton, Virginia.

* Complete information on the Doctor of Science degree program is contained in the *School of Engineering and Applied Science* catalogue.

ISSION

detailed information see "Admission as a Degree Candidate," page 18, and s 23–24.

UIREMENTS FOR THE DEGREE

program of study for the degree of Doctor of Science is divided into two s. The first—made up of a study of interrelated fields of learning which orts the general area of research concentration—culminates in the qualify- examination. The second—composed of research investigation of a partic- subject in a special field and the presentation of such research findings in itten dissertation—culminates in the final examination. The general re- ements for the Doctor of Science degree are (1) a minimum of 30 semes- hours of course work beyond the Master's degree in preparation for the ifying examination; (2) a reading knowledge of one foreign language, pref- ly Russian; (3) the satisfactory completion of the qualifying examination; a dissertation, equivalent to a minimum of 24 semester hours; and (5) the factory passing of the final oral examination.

he candidate must submit to the appropriate department five complete copies he dissertation and two original copies of an abstract (not to exceed 600 ds) of his dissertation no later than the date specified in the calendar. One of the abstract is for inclusion in the announcement of the examination one for reproduction by University Microfilms, Inc. One copy of the dis- tion is also sent to University Microfilms, Inc.

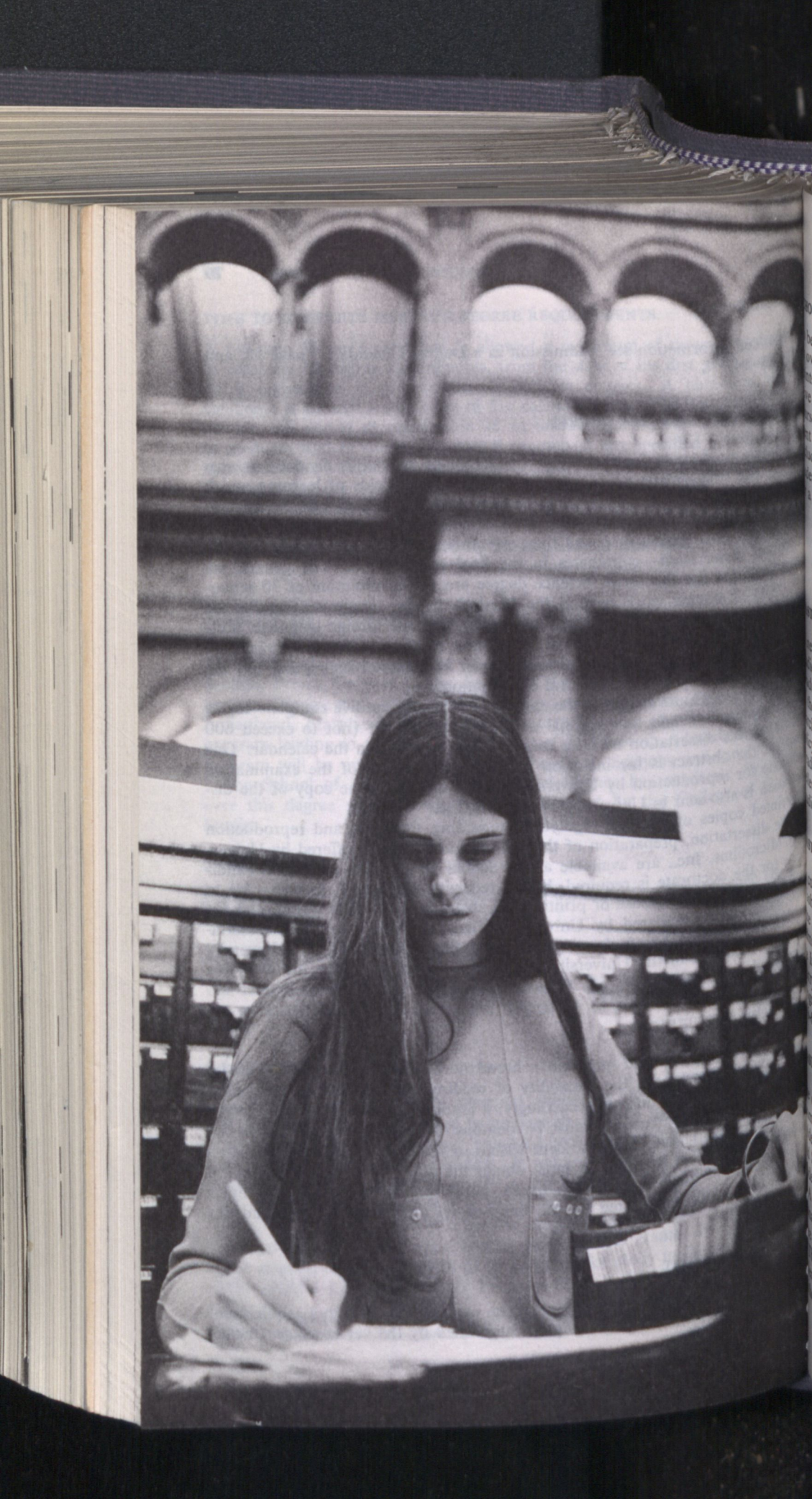
inted copies of detailed regulations regarding the form and reproduction he dissertation, preparation of the abstract, and services offered by Univer- Microfilms, Inc., are available at the School Office. The successful candi- for the doctorate is required, before receiving his degree, to pay a fee to r a part of the expense of printing the abstract of his dissertation, and for basic service rendered by University Microfilms, Inc. Accepted dissertа- , with accompanying drawings, become the property of the University are deposited in the University Library where bound copies are available circulation.

GUAGE REQUIREMENT

octoral student should maintain a broad outlook as he pursues his study, therefore must have the capability of reading appropriate literature pub- d in a foreign language. Accordingly, a reading knowledge of one foreign uage, preferably Russian, must be demonstrated before admission to the ifying examination. If the student wishes to satisfy this requirement with a uage other than Russian, he must obtain the approval first of his doctoral iser, then of his department chairman; permission to use a language other n Russian will be granted on the basis of its importance to the student's d of interest.

L. REQUIREMENT

ddition to the language requirement, an examination in a tool requirement , computer programming) may be established by the various departments.



LARSHIP

admitted to the qualifying examination, the doctoral student must achieve er-all academic average of 3.20 on a scale of 4 (a grade of *A* equals 4 ; *B*, 3 points; *C*, 2 points; and *F*, 0 points). No doctoral student may re- more than two course grades below *B*. If he does receive more than two grades below *B*, his graduate study is terminated and his further enroll- prohibited. Courses in which the student earns grades below *B* are not ed in his total semester-hour requirement for the degree. In the event a t receives any grade below *B*, he is required to consult with his adviser review of his program of study and discussion of possible changes therein.

SPECIAL DEGREE PROGRAMS

ER OF ARTS IN SPECIAL STUDIES (Legislative Affairs)

w program of study leading to the degree of Master of Arts in Special s with a concentration in Legislative Affairs is offered off campus by the iate School of Arts and Sciences. The program, focusing on the Congress United States, includes 12 semester hours in legislative theory and re- , 6 to 12 hours in the processes of politics, and 6 to 12 hours in public analysis. For further information, contact the Office of the Dean of the uate School of Arts and Sciences, telephone 676-6210, or Ralph I. De- , Director of District of Columbia Credit Programs, College of General s, telephone 676-7016.

ER OF SCIENCE IN ADMINISTRATION

operation with the Industrial College of the Armed Forces, Fort McNair, ington, D.C., a program of study leading to the degree of Master of Sci- in Administration is offered by the School of Government and Business nistration. The program is open only to current students and faculty of dustrial College of the Armed Forces. For further information, contact R. Page, Faculty Adviser for the Industrial College of the Armed Forces am, School of Government and Business Administration, telephone 115.

ER OF SCIENCE IN FORENSIC SCIENCE

egree of Master of Science in Forensic Science, an interdisciplinary pro- of study for students concerned with the legal and scientific aspects of ice, is currently being offered on campus by the Graduate School of Arts ciences. The degree program may be offered off campus for a group of ts with mutual goals.

Bachelor's degree from an accredited institution and academic or profes- training in the sciences, are required for admission to the Master's de- rogram.

e program of study leading to the degree of Master of Science in Forensic e consists of 36 semester hours of approved graduate-level courses with or ut a thesis (equivalent to 6 semester hours). The program must include

the following: ForS 201, 202, 203, 204, 224, 226, 227 or 228, and 261 (with a petition to and with the approval of the academic adviser a student may be permitted to substitute other Forensic Science courses for those required). The remaining semester hours of course work must be selected from approved courses in the areas of forensic science, law, management science, and science; however, the selection of these courses must be determined by prior consultation with the approval of an academic adviser in the Department of Forensic Science. There is no tool requirement. All students are required to pass a Master's Comprehensive Examination.

For the general requirements for Master's degree study in the Graduate School of Arts and Sciences and for a description of elective courses suggested in this Master's degree program, see the *Undergraduate and Graduate Catalogue*. For further information, contact the Chairman of the Department of Forensic Science, telephone 676-6480, the Dean of the Graduate School of Arts and Sciences, telephone 676-6210, or Earl Ross, telephone 676-7320.

MASTER OF SCIENCE IN SPECIAL STUDIES (Oral Biology)

In cooperation with the Naval Graduate Dental School of the National Naval Medical Center, and the Army Institute of Dental Research of the Walter Reed Army Medical Center, a program of study leading to the degree of Master of Science in Special Studies with a concentration in Oral Biology is offered by the Graduate School of Arts and Sciences. The program is open to dental officers serving on active duty with the U.S. Armed Forces or with other federal agencies. For further information, contact the Office of the Dean of the Graduate School of Arts and Sciences, telephone 676-6210, or Edward B. Wright, Associate Director of Maryland Credit Programs, College of General Studies, 676-7024.

MASTER OF SCIENCE IN SPECIAL STUDIES (Telecommunication Operations)

A new program of study leading to the degree of Master of Science in Special Studies with a concentration in Telecommunication Operations is offered off campus by the Graduate School of Arts and Sciences. This program is designed to introduce personnel with technical backgrounds in communications to related work in the field of business administration, economics, management science, political science, sociology, and statistics. For further information, contact the Office of the Dean of the Graduate School of Arts and Sciences, telephone 676-6210, or Ralph I. DeBelles, Director of District of Columbia Credit Programs, College of General Studies, telephone 676-7016.

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ucational Services Officer: Ensign D.E. Oliver, USN
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val Amphibious Base, Little Creek, Norfolk, Va. 23521

ucational Services Officer: Ensign Robert C. Balderson, USN
Telephone: (703) 464-7811

val Supply Center, Norfolk, Va. 23512

ining Director: Mrs. Mary K. Lawson
Telephone: (703) 444-4912

S. Atlantic Fleet, U.S. Naval Base, Norfolk, Va. 23511

ucational Services Officer: Warrant Officer George Pearman, USN
Telephone: (703) 444-6945

S. Naval Hospital, Portsmouth, Va. 23708

ining Officer: LCDR G.D. Despiegler, USN
Telephone: (703) 397-6581, Extension 242

S. Naval Station, Norfolk, Va. 23511

ucation Director: LCDR Donald Whittaker, USN
Telephone: (703) 444-7272

COURSES OF INSTRUCTION

ON THE FOLLOWING PAGES OF THIS CATALOGUE, under the alphabetically arranged names of the departments of instruction, are listed the courses of instruction. Courses carrying the designation "Campus Course" are normally offered only on campus. The courses are subject to change. The University reserves the right to withdraw any course announced.

EXPLANATION OF COURSE NUMBERS

Courses are assigned triple numbers, all of which are listed in the *Off-campus Schedule of Classes,* published three times each year. The first is a serial number assigned by the College of General Studies at the time of registration indicating the location of off-campus centers. The second number is the number assigned to the particular department. The third number, the only one of the three which appears in this catalogue, is the course number assigned by the department; this number indicates the academic level of each course, as follows:

COLLEGES AND SCHOOLS OTHER THAN ENGINEERING AND APPLIED SCIENCE

First-group courses.—Courses numbered from 1 to 100 are planned for students in the freshman and sophomore years. With the approval of the adviser and the dean, they may also be taken by juniors and seniors. In certain instances, they may be taken by graduate students to make up undergraduate deficiencies or as prerequisite to advanced courses, but they may not be credited toward a higher degree.

Second-group courses.—Courses numbered from 101 to 200 are planned for students in the junior and senior years. Except for Accounting courses they may be taken for graduate credit only upon the approval of the dean and the instructor at the time of registration. Such approval is granted only with the provision that students must complete additional work in order to receive graduate credit.

Third-group courses.—Courses numbered above 200 are planned primarily for graduate students. They are open, with the approval of the instructor, to qualified seniors; they are not open to other undergraduates. Qualified seniors registering for Accounting, Business Administration, Health Care Administration, Management Science, or Public Administration courses must have a 3.00 average, the prior approval of the department chairman who is responsible for the graduate course, the prior approval of the faculty adviser, and the prior approval of the Dean of the School of Government and Business Administration. Nondegree students who have not completed a Bachelor's degree may not enroll in graduate courses offered by the School of Government and Business Administration.

HOOL OF ENGINEERING AND APPLIED SCIENCE

urses numbered from 1 through 199 are planned for undergraduate credit, lough certain courses may be taken for graduate credit when arrangements approved in advance by the instructor and the Dean. Courses numbered to 300 are planned for graduate credit and may in certain instances be en by qualified undergraduate students. Courses numbered from 301 to 400 primarily for doctoral students.

ESTER HOURS OF CREDIT

e number of semester hours of credit given for the satisfactory completion a course is, in most cases, indicated in parentheses after the name of the rse. Thus, a year course giving 3 hours of credit each semester is marked -3), and a semester course giving 3 hours of credit is marked (3). A semes- hour usually consists of the completion of one fifty-minute period of class rk or of one laboratory period a week for one semester.

REVIATIONS

he description of courses in this catalogue, the following abbreviations are

Accounting	
American Civilization	
Anatomy	
Anthropology	
Applied Science	
Art	
Biological Sciences	
Business Administration	
Cartography	
Chemistry	
Civil Engineering	
Classics	
Computer Science	
East Asian Languages and Literatures	
Economics	
Education	
Electrical Engineering	
English	
Engineering Administration	
Engineering Science	
Epidemiology and Environmental Health	
Forensic Science	
French	
Geodesy	
Geography and Regional Science	
Geology	
Geophysics	
Germanic Languages and Literatures	
HCA	Health Care Administration
Hist	History
Ital	Italian
Jour	Journalism
L Am	Latin American Civilization
Mgt	Management Science
Math	Mathematics
ME	Mechanical Engineering
Micr	Microbiology
Mus	Music
Ocea	Oceanography
OR	Operations Research
Oral	Oral Biology
Phar	Pharmacology
Phil	Philosophy
PE	Physical Education, Health, and Recreation
Phys	Physics
Phyl	Physiology
P Sc	Political Science
Psyc	Psychology
P Ad	Public Administration
Rel	Religion
Slav	Slavic Languages and Literatures
Soc	Sociology
Span	Spanish
S Ed	Special Education
Sp&D	Speech and Drama
Stat	Statistics
TCom	Telecommunication Operations

Accounting

Chairman: A.J. Mastro, Professor of Accounting; Government 302, Telephone 676-6055

Accounting courses numbered below the 200 level may not be taken for graduate credit.

1–2 Introductory Accounting (3–3)

Basic understanding of accounting concepts, procedures, analyses, and reports; the accounting measurement and communication of significant economic and financial data. Prerequisite to Acct 2: Acct 1. Students who have received credit for Acct 115 cannot receive credit for Acct 1–2.

101 Cost and Budgetary Control (3)

Cost behavior and volume-profit relationships, responsibility accounting, standard costs, flexible budgets, cost structures for control and motivation, relevant costs, cost concepts. Prerequisite: Acct 1–2. Students who have received credit for Acct 193 or 215 cannot receive credit for Acct 101.

111 Financial Statement Analysis (3)

The analysis and interpretation of financial statements for the guidance of management, directors, stockholders, and creditors. Prerequisite: Acct 1–2.

115 Survey of Financial Accounting (3)

Development, presentation, and interpretation of financial accounting data necessary to the management process. Students who have received credit for Acct 1–2 cannot receive credit for Acct 115.

121 Intermediate Accounting (3)

In-depth study of accounting functions and basic theory: acquisition of assets and services, income and equity accounting, preparation and analysis of financial statements. Prerequisite: Acct 1–2.

141 Governmental Accounting (3)

Appropriation, encumbrance, and fund accounting for governmental and institutional entities. Prerequisite: Acct 1–2.

144 Federal Accounting (3)

Accounting procedures in the federal government, with emphasis on agency-level accounts and accounting support for cost-based budgets. Prerequisite: Acct 141.

161 Federal Income Taxation (3)

Federal income tax concepts applicable to individuals and corporations, differences between tax accounting and financial accounting.

171 Auditing (3)

Principles and procedures of auditing: generally accepted auditing standards, internal control, audit objectives and reports, form-preparation-use of audit work papers, audit evidence. Prerequisite: Acct 121.

181 Accounting Systems (3)

Organization and use of accounting information: origination, classification, control, and reporting; development, design, and installation of ac-

counting systems; accounting communication patterns. Prerequisite: Acct 101, 171.

191 **Advanced Accounting** (3)

Application of accounting theory to special areas: consolidated statements, business combinations, earnings per share, foreign exchange, price-level adjusted statements, source and application of funds. Prerequisite: Acct 121.

193 **Business Budgeting** (3)

Principles and procedures in the development, installation, and operation of a system of budgetary control to aid management. Prerequisite: Acct 1–2. Students who have received credit for Acct 101 cannot receive credit for Acct 193.

215 **Survey of Managerial Accounting** (3)

Study of the nature, analysis, and interpretation of accounting reports primarily from the management point of view. Prerequisite: Acct 1–2 or 115. Students who have received credit for Acct 101 cannot receive credit for Acct 215.

231 **Contemporary Accounting Theory** (3)

Accounting principles and concepts and recent theories concerned with the valuation and amortization of assets and determination of income. Prerequisite: 6 semester hours of accounting.

241 **Accounting and Related Disciplines** (3)

Interrelationships of accounting and behavioral sciences, economics, mathematical methods, operations research. Prerequisite: 6 semester hours of accounting.

262 **Business Income Taxation** (3)

Federal income tax concepts applicable to corporations, partnerships, and their owners; emphasis on tax planning factors in business decisions and tax research.

275 **Contemporary Auditing Theory and Procedures** (3)

Study of generally accepted auditing standards: internal control and internal auditing, application of statistical sampling to auditing, audit of electronic data processing systems. Prerequisite: Acct 1–2 or 115.

276 **Management Planning and Control** (3)

Integrative case study approach to management systems for planning, control, and decisions: value indices for organizational sub-units, transfer pricing, contemporary control systems, accounting framework and cycle. Prerequisite: Acct 1–2 or 115.

282 **Accounting Information Systems** (3)

Development and application of accounting system theory, including analysis, design, and implementation. Integration of automatic data processing, accounting systems, and management information systems. Prerequisite: Acct 1–2 or 115.

295 **Seminar in Accounting** (3)

Selected accounting studies: critical analysis and evaluation developed in seminar discussions and papers. Prerequisite: Acct 1–2 or 115.

American Civilization*

Director: B.M. Mergen, Assistant Professor of American Civilization, P-10, Telephone 676-6070

71–72 **Introduction to American Civilization** (3–3) (Campus Course)
Themes and issues in American civilization since Colonial times, with emphasis on their contemporary importance.

225–26 **Patterns of American Culture** (3–3)
An approach to understanding American civilization through the study of some of its ethnic and racial groups. The methods will be interdisciplinary, using historical, literary, and sociological material.

271 **Seminar: Research and Teaching in American Civilization** (3)
Consideration of American studies as an area for research and teaching; introduction to bibliography.

Anatomy

Chairman: R.S. Snell, Professor of Anatomy; Ross Hall, Telephone 331-6511

115 **Anatomy for Anesthetists** (3)

†207 **Surgical Anatomy of the Head and Neck** (2)
Gross dissection of the head and neck. Lectures and demonstrations on the development, histology, and neuroanatomy of these regions.

Anthropology

Chairman: R.L. Humphrey, Jr., Associate Professor of Anthropology; X-11, Telephone 676-6075

Departmental prerequisite: Anth 1–2 is prerequisite to all other courses in Anthropology except Anth 158 and 162. This prerequisite may be waived by permission of instructor.

1–2 **Introductory Anthropology** (3–3)
Anth 1: survey of man's origin, physical evolution, and culture history. Anth 2: survey of the world's cultures, illustrating the principles of cultural behavior.

153 **Psychological Anthropology** (3)
Relevance of psychological theories to human evolution and the cross-

* Administered by the American Studies Program.
† Open only to students in the program of study leading to the degree of Master of Science in Special Studies with a concentration in Oral Biology.

cultural study of personality. Cultural determinants of personality formation and mental health.

154 **Mythology and Folklore** (3)

Traditional verbal expression of supernatural or social beliefs; metaphorical thought; verbal art.

157 **Primitive Social Organization** (3)

The analysis of the social organization of primitive peoples; kinship, economic, and political systems.

171 **Native Peoples of North America** (3)

Comparative study of Indian groups representative of each of the culture areas of the continent.

185 **Latin American Archaeology** (3)

The culture history of pre-Columbian Mexico and Central America from the Paleo-Indian period through the Spanish Conquest, emphasizing the origin and development of Latin American high civilizations.

201 **Seminar: the Nature and Scope of Anthropology** (3)

Survey of the development of anthropological thought; examination of the subject matter, methodology, and theoretical approaches of anthropology, especially as they relate to contemporary societies.

202 **Seminar: Recent Trends in Anthropology** (3)

Major topics of interest in contemporary anthropology since the mid-20th century will be taken up in order, stressing current journal and monograph materials.

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airman: F.S. Grubar, Professor of Art; Stuart Basement (front), Telephone 676-

31–32 **Survey of Western Art** (3–3)

Survey of the arts in the Western world from prehistoric to modern times. A foundation for further study in the history of art.

71–72 **Introduction to the Arts in America** (3–3)

Painting, sculpture, and architecture of America, with selected references to crafts and popular arts. Art 71: from Colonial beginnings to the Republican Age. Art 72: from early 19th century to the present.

109 **19th Century Art in Europe** (3)

Painting and sculpture.

110 **Contemporary Art** (3)

Painting and sculpture in 20th century Europe.

112 **Art of Egypt and the Ancient Orient** (3)

Study of the art of Mesopotamia, Anatolia, Egypt, and Persia.

113 **Baroque Art in Italy** (3)

Development of painting, sculpture, and architecture in 16th and 17th century Italy.

115 **Christian Iconography** (3)

Origins and development of Christian symbols and themes from early Christian to modern times.

120 **Art of China and Japan** (3)

Architecture, painting, and sculpture of China, Korea, and Japan.

141 **Interior Decoration** (3)

Principles of decoration dealing with furniture designs and ensemble layout, draperies, color, accessories, and lighting.

145 **Folk Arts in America** (3)

Ceramics, woodcarving, ironwork, decorative painting, weaving, and other crafts.

146 **Principles of Museum Work** (3)

Introduction to the history and development of museums; problems of museum administration, connoisseurship, cataloguing, installation, conservation, and educational service.

155 **Etruscan Art and Archaeology** (6)

Art and Archaeology program in Italy.

156 **20th Century American Art** (3)

An examination and study of the wide range and variety of artistic expression in American painting, sculpture, and architecture from the late 19th century to the present. Given in conjunction with New York University Sunrise Semester program via TV. Off-campus credit only; credit not applicable to campus degree programs.

203 **Primitive Art** (3)

Arts of prehistoric and primitive man in Europe, pre-Columbian Americas, Oceania, and Africa.

Biological Sciences

Chairman: A.H. Desmond, Professor of Zoology; Bell 314, Telephone 676-6090

BIOLOGY

3–4 **Introductory Biology for Nonscience Majors** (3–3) (Campus Course)

Lecture (2 hours), laboratory (2 hours). Survey of biological principles; emphasis on man as a functional organism in his environment. Prerequisite to B Sc 4: B Sc 3. Material fee, $12 a semester.

11–12 **Introductory Biology for Science Major** (4–4) (Campus Course)

Lecture (3 hours), laboratory (3 hours). Biological principles and problems designed to furnish a base for advanced studies in biology and re-

lated sciences. Required of all prospective biology, botany, and zoology majors. Prerequisite to B Sc 12: B Sc 11. Material fee, $15 a semester.

siness Administration

irman: H.R. Page, Professor of Business Administration; Government 302, Tele-ne 676-6115

51 **Introduction to Business** (3)

Structure, activities, and problems of business enterprise; its contribution to the individual and to society; careers in business.

101 **The Business Environment** (3)

Economic and legal environment of business enterprise; social and political influences; contemporary problems and issues.

102 **Fundamentals of Management** (3)

Planning, organizing, directing, coordinating, and controlling activities of the administrative unit; evolution of management thinking.

103 **Institutional Management** (3)

Philosophy of hospital administration: special services, food service, maintenance, internal review.

105 **Personnel Management** (3)

The labor force and labor markets. Industrial personnel and manpower programs, organization and policy in personnel activities.

106 **Problems in Personnel Management** (3)

Principles and problems of personnel management and industrial relations illustrated by cases drawn from industry and government. Prerequisite: B Ad 105.

107 **Collective Bargaining** (3)

American unionism and collective bargaining; economic, social, and public policy considerations. The negotiation and administration of collective bargaining agreements. Prerequisite: B Ad 105 or permission of instructor.

113 **Real Estate** (3)

Principles of urban real estate practice; leasing and property management, valuation, appraisal, financing, taxation, urban growth, urban renewal.

131 **Business Finance** (3)

Analyzing capital requirements and methods of acquiring funds; planning efficient use of capital. Asset management, financial analysis, sources of funds, capital budgeting, stockholder relationships. Prerequisite: Acct 1–2; Econ 1; Math 30, 31; Stat 51.

132 **International Business Finance** (3)

Principles, practices, problems, and institutions of international finance. Emphasis on international financial markets, exchange rates, balance-of-payments restraints, and governmental policies. Prerequisite: B Ad 131.

138 **Investment and Portfolio Management** (3)

Theory and principles of security analysis and portfolio management, including analysis of the national economy, industry, company, and security markets. Risk-reward and computer-aided analysis. Prerequisite: Acct 1–2, B Ad 131.

141 **Basic Marketing Management** (3)

Marketing and marketing management, consumer and demand analysis, retailing, wholesaling. Emphasis on major decision areas and tools. Prerequisite: B Ad 102, Econ 1–2.

143 **Marketing Research** (3)

Principles and practices of marketing research; emphasis on basic methods and techniques, sources and interpretation of data, and presentation of results. Prerequisite: B Ad 141.

158 **Physical Distribution Management** (3)

Distribution from shipper's point of view: problems of plant location, inventory control, warehousing; traffic management emphasized, including private carriage. Prerequisite: Econ 1–2.

161 **Commercial Law: Contracts, Sales, Agency, Bailments** (3)

162 **Commercial Law: Negotiable Instruments, Property, Mortgages** (3)

171 **Principles of Transportation** (3)

Impact of intercity transportation systems on society. Emphasis on modal differences in development, economic characteristics, and regulation. Prerequisite: Econ 1–2.

172 **Public Utilities** (3)

Legal and economic meaning of public utility concept; development, services, economic characteristics, rate-making, and regulation with emphasis on electric, gas, and telephone industries. Prerequisite: Econ 1–2.

173 **Transportation Systems Management** (3)

Comparative study, from the standpoint of various carrier modes, of management problems common to all modes of domestic and international transportation. Prerequisite: B Ad 171, Econ 1–2.

174 **Urban Transportation** (3)

Problems of developing balanced transportation systems for urban areas—area needs, modal evaluation, cost effectiveness, finance, and marketing. Prerequisite: B Ad 171, Econ 1–2; or equivalent.

175 **Introduction to Foreign Trade** (3)

Physical movement of goods in international business; conditions essential for successful trading; export shipment, documentation, procedural problems. Emphasis on ocean marine insurance and export traffic management policy. Prerequisite: Econ 1–2.

178 **International Business Policy and Operations** (3)
(Formerly Management of International Business Operations)

Analysis of overseas projects according to purpose and type of organization; development and management of overseas operations in different world areas. Prerequisite: B Ad 175 or permission of instructor.

181 **Manufacturing Production** (3)

Basic principles and methods of manufacturing production. Manufacturing facilities, plant and equipment. Illustrations selected from various process and fabrication industries.

198 **Business Policy and Administration** (3)
(Formerly Case Problems in Management)

Terminal undergraduate course in Business Administration. Integration of functional activities in arriving at over-all business policy decisions. Prerequisite: B Ad 102, 105, 131, 141, 181.

202 **Relations of Government to Business** (3)

Regulatory and promotional activities of the government, independent regulatory agencies, antitrust activities, monetary and fiscal policy, regulation of labor-management relations.

208 **Personnel Management and Industrial Relations** (3)

Survey of personnel management practices and procedures, including labor-management relations.

209 **Seminar: Personnel Management** (3)

Industrial personnel and manpower management, research in advanced problems.

211 **Leadership and Executive Development** (3)

Theories of managerial leadership; issues and problems associated with leadership in large organizations and at higher management levels; executive selection and development. Prerequisite: Mgt 201 or permission of instructor.

212 **Unionism and Collective Bargaining** (3)

The American labor movement. Collective bargaining and the conduct of labor relations under collective bargaining agreements.

213 **Current Issues in Unionism, Collective Bargaining, and Labor Relations** (3)

Current problems and issues. Prerequisite: B Ad 212.

225 **Seminar: Manufacturing Production** (3)

Production technology, including new processes, materials, products, equipment, and facilities. Implications of emerging technology in managing the production function. Prerequisite: B Ad 181 or permission of instructor.

231 **Financial Decision-making** (3)

Functions and objectives of financial management, asset management, problems of internal financial analysis, rate-of-return analysis, financial forecasting, problems of capital demand and supply. Prerequisite: Acct 115 or equivalent, B Ad 131.

232 **Capital Resource Management** (3)

Problems of capital acquisition, costs, rationing, structure; dividend policy. Prerequisite: B Ad 231.

233 **International Business Finance** (3)

Analysis of problems in international business finance. Impact of the

evolving international payments system on business. Prerequisite: B Ad 131 or equivalent.

235 **Financial Management** (3)

Problems of financial management; planning financial structure, obtaining and managing capital, issuing and placing securities, administering income, security arrangements. Prerequisite: Acct 215, Mgt 201.

237 **Investment Analysis** (3)

Risk-reward analysis of security investments including analysis of national economy, industry, company, and market; introduction to portfolio management; emphasis on theory and computer methods. Prerequisite: B Ad 131.

238 **Seminar: Investment and Portfolio Management** (3)

Portfolio management theory, application, and computer modeling. Independent research on investment analysis and portfolio management with emphasis on theory, cases, and computer applications. Prerequisite: B Ad 237.

241 **Marketing Management** (3)

Marketing management problems; market segmentation, product planning, channels of distribution, advertising, personal selling, sales promotion, pricing and development of integrated marketing programs.

243 **Seminar: Marketing Research** (3)

Research as an aid to decision-making and increased efficiency in marketing, marketing research process, critical appraisal of methods and results, applications.

248 **International Marketing** (3)

Organization for international marketing, demand analysis, product development and policies, marketing structure and trade channels, advertising and promotion problems and policies, pricing, and legal aspects. Effective international marketing strategy.

255 **International Business in Perspective** (3)

(Formerly International Trade)

The nature and order of magnitude of international business; global patterns of trade and investment; international and national institutions; policy issues, trends.

256 **Seminar: International Trade** (3)

Classical and modern concepts of international trade theory, instruments and institutions of trade policy, barriers to trade, preferential treatment and trading blocs, trends and issues.

257 **Operation of the Multinational Firm** (3)

International market entry and expansion; operating policies, procedures, and problems of multinational companies; developing executives for international business. Prerequisite: advanced Master's degree standing.

261 **Managerial Microeconomics** (3)

Applications of economic theory and statistics to business decisions involving demand, production, cost, profits, investments, and inventories. Prerequisite: Econ 217, Mgt 203, Stat 111 and 112; or equivalent; or permission of instructor.

262 **Managerial Macroeconomics** (3)

Use of economic theory and statistics in business forecasting; interpretation of economic trends and developments; analysis of governmental economic policies. Prerequisite: Econ 218, Mgt 203, Stat 111 and 112; or equivalent; or permission of instructor.

275 **Seminar: Transportation** (3)

Problems and special areas of interest in transportation. Prerequisite: B Ad 171 or permission of instructor.

279 **Purchasing and Materials Management** (3)

Industrial purchasing and materials management principles and practices. Organization and functions in materials management. Determination of requirements, source selection, buying practices, policies, and ethics.

280 **Procurement and Contracting** (3)

Overview of procurement and contracting; emphasis on federal government buying policies, practices, and procedures.

282 **Government Contract Administration** (3)

Surveillance over contractor performance of contract. Rights and obligations: changes, suspension of work, default, convenience termination, inspection, warranties, procedures for the settlement of controversies on government contracts. Prerequisite: B Ad 280 or permission of instructor.

283 **Pricing and Negotiation** (3)

Scope and objectives of negotiated procurement; preparation, conduct, and recording of negotiations; analysis of cost, price, profit, investment, and risk; cost principles; incentives; relationship of contract type to work requirements; techniques of negotiation. Prerequisite: B Ad 280 or permission of instructor.

285 **Systems Procurement and Project Management** (3)

Development and procurement of major systems. Project management. Procurement planning—from concept formulation through contract definition, development, and manufacture. Prerequisite: B Ad 280 or permission of instructor.

293 **Business Research** (3)

Theory and practice in research methodology. Data sources and gathering, research models and designs, analysis and testing, controls, interpretation and presentation of findings. May be repeated once for credit.

297 **Business Policy Formulation** (3)
(Formerly Case Studies in Business Administration)

Analysis of operational situations and policy issues. Developing and implementing solutions to managerial problems. Prerequisite: advanced Master's degree standing.

299 **Thesis Seminar** (3) (Campus Course)

Examination of thesis standards, research philosophy and methodology.

300 **Thesis Research** (3)

Cartography*

Program Adviser: Hyman Orlin, Professorial Lecturer in Geodetic and Cartographic Science, Telephone 946-3557

1–2 Introduction to Cartography (3–3)

The use of maps. History of mapping. Introduction to the fundamental concepts of topography, hydrography, and cartography. Characteristics and uses of different kinds of maps and charts, symbolization, representation of relief, geographic and grid coordinates, attributes of various projections, reliability. Making maps. Fundamental concepts of geodesy and geomorphology as applied to maps and charts, surveying methods, application to aerial photography, photo interpretation, map design, compilation and reproduction. Prerequisite to Cart 2: Cart 1.

103–4 Photo Interpretation (3–3)

Photo interpretation and its uses. History of photo interpretation. Fundamental concepts of image interpretation, topography, hydrology, vegetation, and man-features. Parameters affecting photo interpretation. Civil and military interpretation. Measurements, keys, and diagnostic techniques; reliability. Infrared and radar photo interpretation. Satellite photography. Prerequisite or concurrent registration: Geod 17. Prerequisite to Cart 104: Cart 103.

107 Physiography (3)

Development of physiographic concepts; the earth's crust, weathering, climate, and denudation; stream, shore, wind, and ice processes; glaciation; physiographic regions. Prerequisite: Cart 2.

108 Climatology (3)

Introduction, causes for climate and weather, air mass movements, water mass movements, physical features of boundaries. Tropics, subtropics, humid and dry continentals, subarctics.

111 Cartographic Techniques (3)

State-of-the-art orientation in the techniques and procedures currently used in cartographic agencies, including field methods, evaluation of source maps, use of scribing and contact screens in color separation, shaded relief, map reproduction, and associated managerial practices. Prerequisite: Cart 2.

112 Advanced Cartography (3)

Automated cartography, including computer-assisted map compilation, statistical mapping, automated color separation, and revision systems. Aerospace cartography, including orbital navigation, lunar, and planetary charting. Prerequisite: Cart 111.

120 Computer Mapping (3)

Examination of the methods of quantitative computer mapping, drawing primarily on Symap and related statistical mapping programs. Students develop a clear understanding of computer mapping techniques and are provided the opportunity through practical exercises to apply these techniques to a variety of mapping situations. Prerequisite: Cart 2 or permission of instructor. Laboratory fee to be announced.

* Affiliated with the Department of Geography and Regional Science.

125 **Marine Cartography** (3)

Similarities and differences between land mapping and the charting of the marine environment; emphasis on the unique characteristics of the latter. Exploring the extended and imaginative symbology required to depict a visually opaque environment characterized by sparsity of data; the thematic aspects of oceanography charting investigated with detailed analysis of tri-dimensional data shown in bi-dimensional form; certain mathematical concepts of projection and chart design. Prerequisite: Cart 2 or permission of instructor.

hemistry

airman: A D Britt, Associate Professor of Chemistry; Corcoran 104, Telephone 5-6120

YSICAL SCIENCE

3–4 **Fundamentals of Physical Science** (3–3) (Campus Course)

For nonscience majors. Lecture (2 hours), laboratory (3 hours). Selected topics from chemistry, physics, astronomy, and geology are integrated to introduce the nonscience major to the basic methods and achievements of physical science. Laboratory fee, $15 a semester.

EMISTRY

11–12 **General Chemistry** (4–4) (Campus Course)

Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Elementary course in general chemistry, including qualitative analysis. Prerequisite to Chem 11: one year of high school algebra. Prerequisite to Chem 12: Chem 11. Laboratory fee, $21 a semester.

st Asian Languages and Literatures

ng Chairman: Chung-wen Shih, Professor of Chinese; Library 613, Telephone 7106

NESE

1–2 **Beginning Mandarin Chinese, Level I** (3–3) (Campus Course)

Classroom (3 hours), laboratory (1 hour). Fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Asia 2: Asia 1. Laboratory fee, $17.50 a semester.

3–4 **Beginning Mandarin Chinese, Level II** (3–3) (Campus Course)

Classroom (3 hours), laboratory (1 hour). Continuation of grammar and spoken Chinese with more emphasis on the written language and reading. Prerequisite to Asia 3: Asia 2 or equivalent. Prerequisite to Asia 4: Asia 3. Laboratory fee, $17.50 a semester.

Economics

Chairman: Henry Solomon, Professor of Economics; C-617, Telephone 676-6150

Departmental prerequisite: Except for Econ 217–18 and 220, Econ 1–2 is prerequisite to all other courses in Economics.

1–2 **Principles of Economics** (3–3)

Lecture (2 hours), recitation (1 hour). Survey of the major economic principles, institutions, and problems in contemporary life. Econ 1 is prerequisite to Econ 2.

121 **Money and Banking** (3)

Nature of money, credit, commercial banking, and other financial institutions in the U.S. monetary system.

217–18 **Survey of Economics** (3–3)

For graduate students in fields other than economics. Econ 217: price theory. Econ 218: income and employment theory. Departmental prerequisite waived.

220 **Survey of Principles and Issues in Economics** (3)

For students in the Master of Science in Administration degree program. Survey of economic theory and its application to contemporary economic problems. Departmental prerequisite waived.

241 **Labor Economics** (3)

Analysis of labor markets, theories of wages, impact of collective bargaining, causes of unemployment, public policies and programs.

243 **Seminar: Manpower Policy** (3)

Developments leading to expansion of public investment in manpower resources; evaluation of goals and operations of publicly supported programs.

253 **Productivity Analysis** (3)

Concepts, measurement, and analysis of productivity in business and government at aggregate and organizational levels.

Education

Chairman: Donald Linkowski, Associate Professor of Education; C-514, Telephone 676-6940

Departmental prerequisite: A degree from an accredited institution and adequate professional preparation are prerequisite to courses in Education numbered from 201 to 400.

108 **Human Development, Learning, and Teaching** (3)

Lecture (2 hours), field work (3 successive hours each week, preferably in the morning, arranged by the Director of Laboratory Experiences). Principles of effective teaching based on an understanding of human development and the nature of learning. Prerequisite: Psyc 22; Psyc 29 or 112.

112 **Educational Measurement** (3)

Scope, needs, services to students, selection and construction of teacher-made tests, interpretation of tests for evidence purposes. Prerequisite: Educ 108 and 123.

113 **Elementary School Art** (3)

Lecture and laboratory (3 hours), field work—as arranged. For undergraduates in the elementary school curriculum. Materials and methods. Material fee, $5.

114 **Elementary School Music** (3)

For undergraduates in the elementary school curriculum. Program of music activities essential to basic musical understanding. Materials and techniques.

*115 **Elementary School Teaching of Reading** (3)

Introduction to methods, techniques, materials, and activities essential to a good elementary school reading program. Prerequisite: Educ 108 and 123, or teaching experience.

123 **Society and the School** (3)

Historical and social development of education, contemporary issues, co-operation of the school with other community agencies, functions of school personnel.

128 **Children's Literature** (3)

Lecture (2 hours), field work (2 hours). Newer books for children and the children's classics, contribution of literature to child development, children's original expressions.

205–6 **The Curriculum** (3–3)

For experienced teachers. Educ 205: curriculum foundations and issues, comparison of curriculum patterns. Educ 206: curriculum development in subject areas, group consideration of student problems.

207 **Curriculum Materials** (3 to 6)

For experienced teachers. Construction of courses of study and classroom teaching aids, with direct application to students' situations.

208 **Human Development** (3)

Contribution of various disciplines to an understanding of human development throughout the life span; emphasis on practical implications of relevant research.

209 **Child Development** (3)

Interdisciplinary approach to child development. Analysis, interpretation, and practical implications for instruction of research in disciplines contributing to a knowledge of child development.

210 **Adolescent Development** (3)

Interdisciplinary approach to adolescent growth and development. Analy-

* course may not be taken by students who have completed or plan to enroll in Educ 111.

sis, interpretation, and practical implications for instruction of research in disciplines contributing to a knowledge of the adolescent.

212 **Educational Measurement** (3)

Basic measurement techniques; construction, selection, administration, and interpretation of objective and essay-type examinations; statistical analysis of test results; laboratory use of test instruments.

213–14 **History of Education** (3–3)

Educ 213: European backgrounds of American education. Educ 214: evolution of the American school system.

216 **Education of Slow-learning Children** (3)

Identification, nature, and needs of slow-learning elementary and junior high school children. Emphasis on diagnosis and treatment of learning difficulties.

217–18 **Philosophy of Education** (3–3)

Educ 217: to help students formulate a personal philosophy of education. Educ 218: social foundations of education—forces that shape policies and offerings of the school.

219 **Elementary School Classroom Procedures** (3)

Current theories of teaching and learning and their application to teaching acts and strategies of elementary school teachers.

223 **Foundations of Reading Instruction** (3)

Historical and psychological background; evaluation of recent methods, materials, and techniques in teaching reading; demonstrations of diagnostic and teaching techniques.

224 **Reading Problems** (3)

Elementary school reading difficulties; classroom and clinical techniques in testing and teaching. Prerequisite: one or more years of recent teaching experience and a previous course in reading or language arts.

226 **Reading in Secondary School and College** (3)

Methods, techniques, and materials necessary for developing efficient reading skills, including skills in content subjects; organizing and evaluating reading programs.

227 **Basic Issues in Elementary Education** (3)

Identification, definition, and analysis of some of the most important problems facing the contemporary American elementary school.

228 **Instructional Areas in Elementary Education** (3)

Current trends and research on reading, language arts, social studies, mathematics, science, music, art, and physical education.

229 **Administration of Elementary Education** (3)

For experienced teachers and administrators. Achieving instructional objectives, organizing and servicing teaching activities, coordinating school and community life.

231 **Secondary School Classroom Procedures** (3)

Current classroom practices: teacher-pupil planning, group procedures,

initiatory and culminating activities, individual and group evaluation techniques, teaching aids, etc.; review of recent literature.

232 **Supervision of Elementary Education** (3)

For experienced teachers and administrators with two or more years of teaching experience. Review of modern supervisory concepts, including practices in the operation of the elementary school.

233 **Audio-visual Education** (3)

Lecture (2 hours), laboratory (1 hour). Selection, evaluation, and use of audio-visual materials; administrative problems in care, operation, maintenance, and use of such materials and equipment. Material fee, $7.

235 **Analysis of Teaching** (3)

Techniques of analyzing teaching styles and classroom interactions.

236 **Introduction to Education Technology** (3)

Consideration of historical perspective, process, instrumentation, and implementation of self-instructional systems.

237 **Systems Approach to Instructional Design** (3)

Application of systems techniques to the development of an instructional program.

241 **Education of the Gifted** (3)

For classroom teachers. Nature and discovery of giftedness, provisions for the gifted in regular classes, experimental projects.

243 **Human Relations in Education** (3)

Principles and practices in human relations between and among learner, teacher, other school personnel, and parents.

245 **School and Community** (3)

The school as an important member of a team of social agencies that builds the community.

247 **Adult Occupational Education** (3)

Development, current concepts, agencies involved, problems, and trends in adult vocational-technical-occupational education in the United States and foreign countries.

251 **Foundations of Guidance and Personnel Services** (3)

Introductory survey: definitions, scope, principles, historical background, organization, services, emerging trends, and issues.

252 **Organization and Administration of Guidance Services** (3)

Procedure and practice in organizing and administering school guidance and pupil personnel programs. Admission by permission of instructor.

253 **Analysis of the Individual for Purposes of Counseling** (3)

Detailed study of individual analysis and appraisal techniques. Development of systematic case study. Prerequisite: Educ 112 or equivalent.

254 **The Middle School** (3)

Purposes, organization, core program, guidance, developing course of study, extra-classroom activities.

255–56 **Secondary Education** (3–3)

Educ 255: current proposals for improvement of secondary education. Educ 256: current problems in each subject-matter field.

257 **Educational and Occupational Development** (3)

Theories of career development; factors influencing the world of work; procedures for evaluating and using socio-personal, educational, and occupational information.

259 **Secondary School Administration** (3)

For experienced teachers and administrators. Survey of administration, including practices of the modern high school.

260 **Secondary School Supervision** (3)

For experienced teachers and administrators. Review of modern supervisory concepts, including practices in schools.

263 **Human Resource Development: Training and Education** (3)

Concepts and purpose, historical backgrounds, emerging roles of human resource development personnel, program areas. Prerequisite: adequate professional preparation or experience in training, education, and development.

269–70 **School Business Management** (3–3)

Educ 269: philosophy, responsibilities, and functions of the business management office in public education institutions. Educ 270: practicum in educational business management.

271 **The Teacher and School Administration** (3)

Role of federal, state, and local administrative units; school finance; legal controls; school plant; public support; improving teaching conditions.

272 **The Teacher and School Supervision** (3)

Nature, organization, human relationships, and techniques.

275 **Seminar: School Finance** (3)

Educational financial theory, practice, and control, including methods of financing.

276 **Seminar: Public Relations in School Administration** (3)

Purposes, gathering materials, disseminating agencies, publicity media, public participation in policy-making.

278 **School Law** (3)

Sources and scope of school law; legal rights and responsibilities of teachers, pupils, and taxpayers. Other legal problems of major interest to the group.

283 **Higher Education in the United States** (3)

Development, scope, purpose, present status, programs, and trends in higher education in the United States.

284 **Administration of Higher Education** (3)

Government, organization, and administration of colleges and universities; duties of trustees and administrators.

285 **Student Activities** (3)

Nature and purposes of selected activities—homeroom, clubs, assemblies, school publications, student council, interscholastic contest; attention to sponsorship, participation, finance, and evaluation.

291 **Planning the School Plant** (3)

Selection of sites; evaluation of existing buildings; utilization of present facilities; adaptation to curricular needs; building, operation, and maintenance problems.

293–94 **Research and Independent Study** (3–3)

Individual research under guidance of a staff member. Program and conferences arranged with an instructor.

295 **Research Methods and Procedures** (3)

Required of all candidates for graduate degrees in Education. To be taken early in the graduate program.

297 **Personnel Administration** (3)

Organization and administration of personnel programs for educational institutions. Basic philosophy, principles, responsibilities, and functions.

298 **Seminar: Personnel Administration** (3)

Research: policies, rules and regulations, staff organizations, negotiations.

9–300 **Thesis Research** (3–3)

301 **Data Processing in Education** (3)

Machine accounting and computer technology for counselors, teachers, and administrators.

316 **Curriculum Developments in Elementary School Social Studies** (3 to 6)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school social studies curriculum. Admission by permission of instructor.

317 **Curriculum Developments in Elementary School Science** (3 to 6)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school science curriculum. Admission by permission of instructor.

320 **Curriculum Developments in Elementary School Mathematics** (3 to 6)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school mathematics curriculum. Admission by permission of instructor.

354 **Counseling of Minority Groups** (3)

Consideration of problems and approaches related to counseling cultural and racial minorities in American society; emphasis on counseling the disadvantaged in urban areas.

355 **Counseling in Groups** (3)

Principles of group dynamics as related to interaction within groups. Techniques and practice in group counseling.

357 **Mental Hygiene** (3)

Mental health problems; emphasis on needs of counselors, teachers, a others working with children and adolescents.

370 **College Students and Their Community** (3)

Survey of literature on the characteristics, behavior, and attitudes of th contemporary college student; college student interaction with his envi onment. Admission by permission of instructor.

371 **Introduction to College Teaching** (3)

General principles, methods, techniques, and experimental instructiona media for teaching at the college and university level.

372 **Internship in College Teaching** (3 to 6)

Supervised experience in a selected area of college teaching. Prerequisite Educ 371. Admission by permission of instructor.

373 **The Junior-Community College** (3)

The two-year college as it relates to secondary education, four-year col leges, and universities. Objectives, curricula, students, faculty, legal con cerns, and special problems of two-year colleges.

374 **Current Issues in Higher Education** (3)

Prerequisite: Educ 283, 284.

375 **Foundations of a College Student Development Program** (3)

College student development as an integral part of higher education pro grams.

380 **Sensitivity Training: Laboratory Method** (3)

A sensitivity learning experience in human relations using unstructured group experience, individual feedback, experimentation, and practice. Ad mission by permission of Department, prior to registration.

381 **The Adult as a Learner** (3)

Psychology of learning as applied to adults; effect of age on learning; physical and social environment in adult education situations.

382 **Methods in Adult Education** (3)

Methods, techniques, and devices in adult education; traditional methods, developing action-oriented learning situations, programmed instruction, and systems approach in developing training programs.

383 **Counseling of Adults** (3)

Theories and practical applications of occupational counseling, emphasiz ing distinct needs of adults and young adults; primarily intended for coun selors in military, government, business, and industrial organizations.

384 **Evaluation of Adult Education** (3)

Measurement and evaluation of adult education in school and nonschool agencies—business, industry, government, voluntary organizations, and community.

386 **Current Issues in Adult Education** (3)

387 **Administration of Adult Education** (3)

Program administration, staff recruitment and development, fiscal operations, facilities, and maintenance of effective community relations.

389 **Consultant-Client Relationship in Human Resource Development** (3)

390 **Legal Problems in Higher Education** (3)

Investigation of legal problems in higher education related to administration, students, faculty, and academic program.

391 **College and University Curriculum** (3)

Development, patterns, creative design, issues, problems, evaluation, and trends in the higher education curriculum.

392 **Financing Higher Education** (3)

Analysis of private, state, and federal revenue sources; student aid, program budgets, and financial methods and practices.

393 **Practicum in Higher Education** (3 to 6)

Supervised field experiences in higher education; reports and conferences. Admission by permission of instructor.

394 **College and University Governance** (3)

Organizational and administrative structures, patterns, and relationships in higher education. Prerequisite: Educ 284.

395 **Problems and Practices in School Administrative Organization** (3 to 6)

Application of principles and practices concerned with change and evaluation of educational administration.

399 **Seminar: Applied Educational Administration** (3 to 6)

Application of the theories and principles of administration to the public schools. Student participation with guidance by recognized regional practitioners.

gineering and Applied Science

rdinator of NASA-Langley Graduate Program: S.W. Yuan, Professor of Engi-ng and Applied Science, Tompkins 313, Telephone 676-6529

gram Adviser of Naval Ship Research and Development Center, Carderock, Md.: Feir, Professor of Civil Engineering, Tompkins 109, Telephone 676-7526

gram Adviser of Naval Ship Research and Development Center, Annapolis, Md.: Yuan, Professor of Engineering and Applied Science, Tompkins 313, Telephone 6529

LIED SCIENCE

115 **Probabilistic and Statistical Methods in Engineering** (3)

Solution of engineering problems using sets and functions; probability models; distributions and functions; statistical concepts and methods, including hypothesis testing, correlation, and regression. Prerequisite: Math 32.

211 **Mathematical Methods in Applied Science I** (3)

Introduction to analytic function theory, including contour integration and conformal mapping. Elements of integral transforms with application to boundary-value problems. Prerequisite: approval of Department.

212 **Mathematical Methods in Applied Science II** (3)

Introduction to theory of finite and infinite dimensional vector spaces, generalized Fourier series, completeness property. Tensor calculus, curvilinear coordinates. Prerequisite: approval of Department.

213 **Mathematical Methods in Applied Science III** (3)

Classification of second-order linear partial differential equations, characteristics. Solution of boundary-value problems, associated with various equations of mathematical physics by separation of variables and Green's functions. Prerequisite: approval of Department.

214 **Mathematical Methods in Applied Science IV** (3)

Introduction to calculus of variations, Euler-Lagrange equations, variational formulation of boundary-value problems and approximate methods of solution. Theory of linear integral equations, including Fredholm and Hilbert-Schmidt theory. Prerequisite: approval of Department.

215 **Mathematical Methods in Applied Science V** (3)

Perturbation methods in engineering: nonlinear ordinary differential equations, topological and classical methods of solution, asymptotic series, boundary-layer solutions; nonlinear partial differential equations, boundary-layer solutions which include singular initial value and boundary-value problems. Prerequisite: approval of Department.

CIVIL ENGINEERING

253 **Failure and Reliability Analysis of Engineering Structures** (3)
(Formerly CE 196)

Operational and structural failure mechanisms; instability, fracture, and fatigue. Operational and structural safety, probability of failure. Aspects of probabilistic structural analysis, statistics of extremes, risk and reliability, optimal design criteria. Prerequisite: Ap S 115 or equivalent.

254 **Special Topics in Structural Mechanics** (3)

Selected problems in structural mechanics, including thermal stresses in one- and two-dimensional structures, impact of elastic bodies, and other current topics of interest. Prerequisite: CE 210 *Methods of Structural Analysis* (3) or approval of Department.

259 **Theory of Ship Motions and Sea Loads** (3)

Equations of motion for a body in an infinite fluid. Hydrodynamics of bodies oscillating in calm water. Two-dimensional added mass and damping for cylinders in the free surface. Forces and moments on a fixed body in waves (the diffraction problem). Linear-strip theory for six degrees of freedom motions for ships and ocean structures in regular waves. Nonlinear-roll motions. Dynamic loads on floating vehicles and fixed structures in a seaway. Prerequisite: CE 268, 271; or equivalent.

260 **Statistical Theory for Ship Hull Performance Prediction** (3)

Basic principles and concepts of spectral analysis, probability theory, and related topics necessary for the statistical prediction of ocean waves, ship

motions, and stresses in a seaway. Linear systems superposition principle and cross-spectral analysis. Distribution of envelope of a narrow-band random process and random sample (observation) and estimation. Long-term prediction, prediction of extreme values, time-domain analysis and transient wave-test technique. Prerequisite: approval of Department.

261 **Analysis of Plates and Shells** (3)

Bending and stretching of thin elastic plates under loading with various boundary conditions, continuous plates and plates on elastic foundations, theory of folded plate structures. Theory of curved surfaces; general linear bending theory and its simplification to membrane theory; bending stresses in shells of revolution, shallow shell theory. Specific applications. Prerequisite: graduate status.

263 **Theory of Structural Stability** (3)

General criteria for stability; buckling of elastic and inelastic columns and frames; torsional and lateral buckling; variational methods. Buckling of plates and shells under static loads; stability of stiffened structures; effect of imperfections and boundary conditions. Prerequisite: graduate status.

268 **Applied Marine Hydromechanics** (3)

Introductory course; emphasis on experimental methods, dealing with the application of hydrodynamics to problems relating to the design and performance of ships in the following areas: ship hydrostatics (terminology and concepts), ship resistance (viscous, form, and wave drag), propulsion (screws and other propulsors), dynamics of floating vehicles (maneuvering and control, ship motion in a seaway). Special attention in each area to solving problems related to unusual, as well as conventional, marine vehicles. Prerequisite: approval of Department.

271 **Theoretical Marine Hydromechanics** (3)

Introductory course designed to acquaint the student with some physical concepts and mathematical tools of theoretical marine hydromechanics. Derivation of the fundamental equations and boundary conditions of a fluid media; application of potential flow theory to fluid motion around two- and three-dimensional bodies; perturbation concepts. Introduction to thin-ship and slender-body theories. Derivation of force and moment of bodies moving in calm and disturbed water. Prerequisite: approval of Department.

274 **Mechanics of Water Waves** (3)

Basic concepts. Infinitestimal waves: irrotational theory for deep- and shallow-water waves, reflexion, refraction, diffraction, attenuation. Water waves of finite amplitude: airy nonlinear shallow-water theory, tides, bores, long-waves theory, conoidal and solitary waves, kinematic waves, mass transport. Wave generation by wind: resonance, shear-flow, and maser mechanisms; state-of-the-art based on correlation between theory and measurements. Interfacial (internal) waves. Wave-breaking and reflexion. Prerequisite: ME 221 or equivalent and permission of instructor.

275 **Special Topics in Ocean Engineering** (3)

Fundamental laws of motion for a laminar viscous fluid. Topics include turbulence, jets and wakes, transition and turbulent boundary layer with emphasis on the application to marine problems of boundary-layer control and polymer drag reduction. Prerequisite: approval of Department. May be repeated for credit.

COMPUTER SCIENCE

201 Introduction to Computer Systems I (3)

Introduction to programming of digital computers in a macro-assembly language and higher-level procedural languages; techniques in machine control and memory addressing; data structures, list and string processing in data processing; characteristics and choice of data processing language; introduction to PL/1 language; sorting, searching, and merging of data. Prerequisite: EE 51 *Applications of Computers* (3) or equivalent; or permission of instructor.

202 Introduction to Computer Systems II (3)

Introduction to combinational and sequential logic networks; analysis and synthesis of switching circuits using Boolean algebra; minimization techniques in the design of logical circuits; number systems and arithmetic in digital computers, digital computer architecture and the design of functional sub-units; design of memory, arithmetic, and units comprising a digital computer; information flow, timing, and control in large digital computers. Prerequisite: CS 201 or permission of instructor.

231 Finite State Machines (3)

Analysis and design of sequential networks, state diagrams, flow table, equivalence of states, races, transition maps, output tables, hazards, synchronous and asynchronous sequential networks. State assignment problem, partitions, partition pairs, information flow inequalities, clocks, state realizations, parallel and serial decompositions, machine networks and decompositions. State identification. Prerequisite: EE 153.

237 Computing Systems (3)

Organization of large digital computer systems. Design of high-speed arithmetic units. Random access and associative memories; rotational storage devices; computer control and interrupt structures. Input-output channels and interfacing problems. Communications in digital computers. Introduction to multiple access and time-sharing systems. Prerequisite: EE 154 *Digital Computer Design* (3).

263 Digital Computer Programming Systems (3)

Introduction to the design of computer software and software systems. Design of assemblers and monitor systems. Communication between components of systems. Design of loaders, input-output control systems, and utility systems. Prerequisite: EE 157 *Machine and Assembly Language Programming* (3) or permission of instructor.

285 Approximation of Functions and Data Representations (3)

Review of linear spaces; least squares, orthogonal functions; nonlinear techniques, gradient search methods; parameter estimation with discrete data; Tchebysheff approximation; approximation and curve fitting by Spline functions and Bernstein polynomials.

ELECTRICAL ENGINEERING

152 Introduction to Digital Computers (3)

Introduction to the use and structure of digital computers, addressing methods, data processing, and machine language programming; Boolean algebra and introduction to the design of combinational switching circuits; number systems and arithmetic in digital machines; machine subsystems

and their interconnections; use of software systems and software-hardware relationships. Prerequisite: EE 51 *Applications of Computers* (3) or permission of instructor.

153 **Design of Switching Systems** (3)

Switching algebra and Boolean logic; analysis and design of switching devices; design of combinational and sequential logic networks; minimization techniques and their use in logic design; electronic implementation of logic; number systems and codes, geometric interpretation, error-correcting codes; encoding and decoding; logic and electronic design of functional digital units. Prerequisite: EE 152 or permission of instructor. May be taken for graduate credit.

201 **Natural Modes and Transients in Electrical Systems** (3)

Transient response and natural modes of electrical systems; techniques for analyzing systems with periodic and aperiodic inputs and outputs; sampling.

202 **Linear System Theory I** (3)

Graph theory and its application to networks and systems; system description in time and frequency domain; linear spaces and linear operators; mathematical representation of linear systems; analytical and computer solutions of the state equations; transient and steady-state response. Prerequisite: graduate status.

203 **Linear System Theory II** (3)

System properties; controlability and observability of linear systems; sensitivity and stability analyses. Irreducible realizations of rational transfer-function matrices; canonical forms, state feedback, and state estimators. Linear composite systems. Prerequisite: EE 202.

204 **Stochastic Signals and Noise** (3)

Probability, random variables, characteristic functions; transformations of random variables and applications; sequences of random variables, linear mean-squared estimation; stationary estimation, stationary random processes, correlation functions, power spectrum; output of linear systems with stochastic inputs; Gaussian processes. Applications drawn for communications, control theory, computer science.

224 **Quantum Electronics of Masers and Lasers** (3)

(Formerly EE 325 Principles of Lasers)

Basic concepts from quantum mechanics; Einstein coefficients; inversion and pumping mechanisms; rate equations. Resonators, He-Ne laser; organic dye lasers; injection lasers. Nonlinear interactions in lasers. Prerequisite: EE 221 *Physical Electronics I* (3) or equivalent.

235 **Antennas** (3)

General solution of Maxwell's equations in terms of current sources, the far field approximations, radiation from current distributions, field equivalence theorems, the geometrical optics approximation, aperture antennas, receiving antennas, the theory of arrays, and applications to specific antennas and antenna types. Prerequisite: EE 230 *Electromagnetic Theory* (3).

241 **Information Theory** (3)

Measure of information, noiseless coding; communication channels, channel capacity, the noisy channel coding theorem; bounds on the perform-

ance of communication system; the Gaussian and binary symmetric channel; feedback communications systems; rate-distortion theory. Prerequisite: EE 204.

242 **Coding Theory** (3)
(Formerly Information Theory II)
Error-correcting codes; bounds on the performances of error-correcting codes, group codes; syndrome decoding; cylic codes, their encoding and decoding; Galois fields; BCH codes, burst correction, and threshold-decodeable codes; performance calculations.

243 **Communication Theory I** (3)
Optimum receivers for vector channels and for the additive white Gaussian noise channel; correlation detectors, matched filters; coherent and noncoherent detection and their error probabilities for simplex, orthogonal, and coded systems; bounds on the performance of communications in Gaussian noise; comparison of communications systems. Prerequisite: EE 204 or equivalent.

244 **Communication Theory II** (3)
Schemes for efficient signaling for data sequences; effects of quantizing at the receiver; detection of such signals in colored noise; detection of stochastic signals; the innovations approach in detection and estimation problems; signaling over fading channels and the optimum receivers; diversity techniques and their performances.

245 **Signal Detection and Estimation Theory** (3)
Statistical detection theory, hypothesis testing, sequential detection, estimation theory, maximum likelihood and Bayes methods, estimation of signal parameters and continuous wave forms, Wiener and Kalman filters, applications to the design of optimum receivers, adaptive systems. Prerequisite: EE 241, 244; or equivalent.

273 **System Optimization** (3)
(Formerly Optimal Programming and Control)
Parameter optimization problems; theory of minima and maxima; optimization problems for dynamic systems; calculus of variations; the maximum principle and the Hamilton-Jacobi equation; optimization problems with constraints; optimal feedback systems; numerical solution of optimal programming problems. Prerequisite: EE 202 or equivalent.

274 **Nonlinear Systems** (3)
(Formerly Nonlinear Control Systems)
Definition of linear and nonlinear systems; introduction to approximate analysis of nonlinear systems—describing functions, Krylov and Bogoliubov's asymptotical method and Tsypkin's locus; forced oscillations—jump resonance; stability analysis—Liapunov's criterion, Luré's problem, and Popov's method. Prerequisite: EE 202, 203.

298 **Research** (arr.)
Research as arranged. May be repeated for credit.

299–300 **Thesis Research** (3–3)

399 **Dissertation Research** (arr.)
Limited to Doctor of Science candidates. May be repeated for credit.

NGINEERING ADMINISTRATION

211–12 **Engineering Administration** (3–3)

Comprehensive and systematic study of the administrative process with emphasis on industrial, scientific, and engineering environments. Planning: objectives, prediction, policies, plans and characteristics of plans. Organizing: theory of organization, structure, authority, specialization, delegation, staff and committees. Directing: leadership, managing human and material resources. Controlling: setting standards, evaluating performance, using system feedback data for correction and improvement.

269 **Elements of Decision-making and Problem-solving** (3)

History and orientation of quantitative methods; concept of quantitative decision-making; decision criteria under certainty, risk, and uncertainty; game theory; utility; the time factor; replacement models. Prerequisite: E Ad 170 *Basic Quantitative Methods for Engineering Administration* (3) or equivalent.

GINEERING SCIENCE

203–4 **Probability and Statistics of Metrology** (3–3)

Probability distributions, discrete and continuous distributions; sampling; combinatorial analysis; stochastic processes; conditional probability; correlation; analysis of variance; design and analysis of experiments; Latin Square experiments; factorial experiments; block and lattice design. Prerequisite: Ap S 115 or equivalent.

217 **Analytical Mechanics** (3)

Fundamental principles, generalized coordinates, variational principles and Lagrange's equations, nonholonomic systems, Hamilton's equations, theory of small oscillations. Prerequisite or concurrent registration: Ap S 211.

220 **Nonlinear Mechanics** (3)

Topological and analytical methods in nonlinear mechanics, nonlinear resonance, relaxation oscillations. Prerequisite: ES 217.

221 **Theory of Elasticity I** (3)

Infinitesimal strain and compatibility; stress, constitutive relations for isotropic solids, displacement and stress formulation of boundary-value problems, energy principles, the reciprocal theorem, elements of pure torsion and flexure of rods; plane problems in elastostatics and dynamics illustrating stress function and Fourier transform methods. Prerequisite: approval of Department.

231 **Solid State for Engineers** (3)

Crystal structure and binding, elastic constants, lattice vibrations, thermal properties, free electron theory of metals, band theory of solids, semiconductors, rectifiers and transistors, superconductivity. Prerequisite: approval of Department.

232 **Advanced Materials Science** (3)

Simple crystal structures; the defect crystal structure—point defects, line defects, surface defects; grain-boundaries; X-ray and electron diffraction; diffusion in solids, metallic solutions, and compounds; ceramics; polymeric materials; elastic properties; internal friction; geometry, statics, and dynamics of dislocations; microplasticity, plasticity, work-hardening, and fatigue;

creep; strengthening mechanisms; radiation damage; cohesive strength. Prerequisite: approval of Department.

234 **Composite Materials** (3)

Principles of composites and composite reinforcement; micromechanics and failure; interface reactions in various composites; reinforcing materials; structure of composites—fiber-reinforced polymers, filler-reinforced polymers, fiber-reinforced metals, directionally solidified alloys, dispersion-strengthened metals. Prerequisite: approval of Department.

237 **Quantum Mechanical Treatment of Metals** (3)

Elements of quantum mechanics, including Schroedinger equation and elementary perturbation theory. Applications to basic processes in the theory of solids: lattice waves, electron states, electron-electron and electron-phonon interactions. Boltzmann equation and transport properties; Fermi surfaces; theory of superconductivity. Prerequisite: ES 231 or approval of Department.

239 **Physical Ceramics** (3)

Crystal chemistry and the systematic study of the structure of ceramic materials; solid reactions occurring at elevated temperatures; sintering, vitrification, diffusional mechanisms and effects; reaction rate theory; elastic, anelastic, and plastic properties of ionic and covalent solids; viscoelastic behavior of vitreous and vitreous-solid systems; phase equilibria of ceramic systems. Prerequisite: approval of Department.

240 **Fracture Mechanics** (3)

Fundamentals of brittle fracture, Griffith theory and extensions, mechanics of fracture, linear elastic systems, plasticity considerations, fracture toughness, engineering analysis, notch strength analysis with limit approach, crack propagation laws, fatigue, fracture testing, comparison of recent continuum theories. Prerequisite: approval of Department.

263 **Atmospheric Physics for Engineers** (3)

Introduction to physical processes in the earth's atmosphere; comparisons to the atmospheres of other planets. Topics: evolution, structure, dynamics, visible phenomena, the ionosphere, and radiation processes. Prerequisite: approval of Department.

270 **Introduction to Acoustics** (3)

Waves in an infinite homogeneous medium; sound transmission in layered media and through structure, source, and dipole fields; sound propagation in ducts and enclosures; sound propagation through atmosphere and acoustic absorptions, acoustic circuit elements; acoustic transducers; introduction to acoustic measurements. Prerequisite: approval of Department.

271 **Random Process Theory I** (3)

Probability theory and distributions; random variables and types of random processes; relations between correlation functions, power spectra, and indicial response; measurement and use of power spectra; behavior of physical systems under random inputs. Prerequisite: approval of Department.

272 **Random Process Theory II** (3)

Discrete and continuous state Markov-processes; chains, queues, diffusion, and passage problems; linear and nonlinear estimation and stochastic control; estimation of correlations and power spectra; applications in commu-

nication theory; scattering from random surfaces; stochastic linearization and stability. Prerequisite: ES 271.

273 **Time Series Analysis** (3)

General properties of stationary and nonstationary random processes. Correlation techniques, types of harmonic analysis, analog and digital spectral estimation, variability of estimates, prediction and filtering of time series. Applications in communications, vibration, and fluid dynamics. Prerequisite: approval of Department.

274 **Noise and Vibration Control** (3)

Introduction to the physical effects of noise and vibration on man, practical sources of noise and their control; building noise, ventilation system noise, mechanical equipment noise, aircraft noise; automobile and truck noise; factors affecting vibration levels and vibration control by structural design, damping, and isolation. Prerequisite: ES 270, ME 215.

275 **Advanced Theoretical Acoustics** (3)

Acoustic wave motion, several methods of solving inhomogeneous wave equation, theory of sources, scattering and diffraction, duct propagation, introduction to acoustically coupled systems, acoustics in moving media. Prerequisite: Ap S 213, ES 270.

276 **Acoustical and Mechanical Measurements** (3)

Characteristics of signals, basic transducer elements, standards of measurements and calibrations, signal recording and processing, acoustical and vibration instrumentation, vibration exciters, vibration testing techniques, flow mechanical measurements. Prerequisite: ES 270, ME 215.

277 **Physical Acoustics** (3)

Concepts of continuum mechanics and thermodynamics, wave propagation in real media, thermal viscous and relaxational attenuations, piezoelectric crystals and ultrasonics, wave propagation in rigid and deformable porous media. Prerequisite: ES 275.

278 **Psychological and Physiological Acoustics** (3)

Auditory system and its response to sound, experimental methodology in psychoacoustics, subjective response to sound, environmental noise and its evaluation, criteria for the prediction of noise nuisance, nonauditory system response to noise. Prerequisite: approval of Department.

279 **Human Factors in Engineering** (3)

Man-machine interface, effects of physical stresses on human behavior and performance, life support system, learning and conditioning of physical stresses.

280 **Special Topics in Acoustics** (3)

Current methods and problems in acoustics. Topics chosen from such areas as aerospace noise generation and control; instruments and procedures for acoustics measurements; and responses of structures, people, and communities to noise. Prerequisite: approval of Department.

284 **Numerical Methods in Engineering** (3)

Review of programming fundamentals; matrix operations and solution of simultaneous equations; difference methods and computer solution of ordinary and partial differential equations; numerical solution of initial and

boundary-value problems in heat transfer, fluid flow, and structural mechanics. Prerequisite: approval of Department.

285 **Finite Element Methods in Engineering Mechanics** (3)
Derivation of fundamental equations based on energy formulation; stiffness properties of basic finite elements; solution of problems in plane stress and strain, plane- and space-framed structures; plate and shell structures; elastoplastic and dynamic analysis. Prerequisite: approval of Department.

286 **Analysis and Design of Thin-walled Structures** (3)
Statistics of thin-walled beams and panels, force interplay between stiffeners and skin in the analysis and design of stiffened thin-walled structures; strength and stiffness of locally buckled stiffened structures; classification of loads and safety factors; different considerations governing the design of thin-walled structures; critical evaluation of various structural design procedures. Prerequisite: CE 261, 263; ES 285.

287 **Automated Design of Complex Structures** (3)
Review of techniques for automated design including mathematical programming, fully stressed design, and optimality criteria; application of automated design techniques to stiffened and composite shell-type structures; multiple-load conditions and design constraints. Prerequisite: approval of Department.

289 **Special Topics in Structural Design** (3)
Prerequisite: approval of Department.

298 **Research** (arr.)
Basic research projects as arranged. May be repeated for credit.

299–300 **Thesis Research** (3–3)

310 **Aeroacoustics** (3)
General theory of aerodynamic sound generation and propagation, Lighthill's formulation of jet noise, similarity laws, supersonic and subsonic jet noise, boundary-layer noise, fan and compressor noise, helicopter noise, sonic booms. Current problems in aeroacoustics. Prerequisite: ES 275.

311 **Nonlinear Acoustics** (3)
Finite amplitude waves and waves in moving stratified media. Interaction between linear and nonlinear waves, wave propagation through nonlinear media, applications to transmission of sound through ducts with flow and absorbing walls. Prerequisite: approval of Department.

312 **Theory of Random Vibration** (3)
Response of linear systems to stationary random inputs. Failures resulting from dynamic response. Response of space vehicle structures to intense noise fields, measurement, and application. Prerequisite: ES 271, ME 215.

313 **Structural Acoustic Interaction** (3)
Coupled response of structures to sound, system of infinite extent, system of finite extent, sound radiation from structure, sound transmission through structure. Panel response to turbulent boundary-layer excitation. Sound radiation from mechanically excited structure vibration. Prerequisite: ES 270, 312.

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit.

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit.

CHANICAL ENGINEERING

215 **Theory of Vibrations** (3)

Damped and undamped natural vibrations, transient response and response to harmonic and periodic excitation, natural vibration of discrete and continuous systems; integral formulation of eigenvalue problems, response by modal analysis, approximate methods, influence of secondary effects and constraints, damped systems. Prerequisite: approval of Department.

216 **Structural Dynamics** (3)

Methods of solving vibration problems: differential equation, Rayleigh-Ritz finite element. Free and forced vibration of structural components: straight, curved, and thin-walled beams; plates and shells; sandwich construction. Vibration of built-up structures. Structural wave motion, wave motion in periodic structures. Prerequisite: ME 215.

221 **Intermediate Fluid Mechanics** (3)

The continuum, kinematics of fluids; stress tensor, strain and rate-of-strain tensor; fundamental equations of the flow of viscous compressible fluids; Laplace's equations; source, sink, and doublet; vortices, Biot-Savart theorem and the flow field of a vortex; spherical and cylindrical harmonics; methods of singularity distributions, complex-variable methods; laminar flow of viscous incompressible fluids; boundary-layer concept. Prerequisite: approval of Department.

222 **Applied Fluid Dynamics** (3)

Subsonic lifting line wing theory, direct and inverse solution of the lifting surface theory; singularity method for wing-body combination; vortex lift theory; effects of camber and twist distribution; transonic airfoils, effect of wing sweep, area ruling concept; supersonic linearized wing theory; similarity rules. Prerequisite: ME 221 or equivalent.

227 **Viscous Flow** (3)

Exact solution of Navier-Stokes equations; the small Reynolds number approximations, laminar boundary-layer theory and the techniques for its solution, stability of laminar flows; Reynolds theory of turbulent stresses, applications to internal and external flows, turbulent boundary-layer theory; applications to heat-transfer problems; flow separation. Prerequisite: Ap S 213; ME 221 or equivalent.

235 **Compressible Flow** (3)

Thermodynamics and physical properties of gases, fundamental equations of a compressible inviscid fluid, small perturbation theory, expansions in Mach number and thickness parameters, second-order shock shapes, role of entropy in supersonic flow, shock wave interactions, hodograph transformation, Kármán-Tsien and other model gases, conical flows, transonic flow theory, method of characteristics, rotational nonisentropic flows. Prerequisite: Ap S 213; ME 221 or equivalent.

237 **Propulsion I** (3)

Basic concepts of propulsion: energy transformations in propulsive flows; gas dynamics of combustion, detonation processes; nonuniform flows, mixing; intakes, additive drag; mechanics of flow induction; drag and thrust generation; multiple-flow thrust generators; thrust recovery and augmentation; the propulsion spectrum. Illustrative examples will include propellers, turbojets, turbofans, ramjets, and rockets. Prerequisite: approval of Department.

238 **Propulsion II** (3)

Advanced propulsion concepts: nonsteady flows with viscosity, heat exchanges, and entropy gradients; discontinuities and interaction in nonsteady flow; gas dynamics of nonsteady combustion; static, dynamic, and cryptosteady pressure exchange; energy equalizers and dividers; nonsteady-flow thrust generators. Topics for discussion will include a variety of new flow induction and propulsion concepts. Prerequisite: ME 237.

248 **Seminar: Aircraft Design** (3)

Problem of designing an aircraft to certain specifications. Regulatory restraints and requirements, state-of-the-art limitations, computer-aided design, integration of aircraft components, economic considerations, and iterations to final configuration to obtain specified mission profile. Prerequisite: approval of Department.

270 **Aerodynamics of Flight Vehicles** (3)

Aerodynamic loads on flight vehicles, interference effects, application of aerodynamic theory to aircraft design, studies of aircraft dynamics and performance. Prerequisite: ME 222 or equivalent.

271 **Flight Dynamics of V/STOL Aircraft** (3)

Various configurations of V/STOL aircraft, review of airscrew theory and rotating wing mechanics, dynamics of rotating wing systems, aeroelasticity of rotor blades and analysis of vibrating modes, performance of V/STOL aircraft. Prerequisite: ES 217 or equivalent.

272 **Stability and Control of V/STOL Aircraft** (3)

Static longitudinal stability, longitudinal and lateral dynamic stability, influence of aerodynamic parameters on flight characteristics, transfer function of V/STOL aircraft, effect of feedback on stability of V/STOL aircraft. Prerequisite: ME 271.

273 **Principles of Automatic Flight Control** (3)

Design of aeronautical instrumentation and feedback controls; mathematical models of sensors, controllers, and actuators; theory of feedback control, stability, accuracy, and speed of response; equalization effects of nonlinearities and noise. Prerequisite: approval of Department.

274 **Principles of Flight Guidance** (3)

Guidance requirements for atmospheric flight; implementation of guidance systems using inertial and radio techniques in conjunction with automatic data processing. Prerequisite: ME 273.

275 **Stability and Control of Vehicles** (3)

Derivation of equations of motion, Euler transformations and direction cosines, stability derivatives and linearization of equations of motion, stability of linear systems with application to longitudinal and lateral dynam-

ics, Laplace transform techniques and frequency response analysis. Prerequisite: ES 217 or approval of Department.

276 **Mechanics of Space Flight** (3)

First- and second-order Hamiltonian-Jacobi perturbation theory applied to artificial satellites, von Zeipel's methods, special and general perturbation theories for third-body perturbations. Differential correction of orbits by weighted least squares and minimum variance techniques. Comparison of various filtering techniques as applied to orbit determination and other space flight parameter estimation. Prerequisite: ES 217 or approval of Department.

279 **Special Topics in Flight Sciences** (3)

Current problems and methods in V/STOL flight dynamics, advanced flight concepts, instrumentation, guidance, and control. Prerequisite: approval of Department.

280 **Advanced Thermodynamics** (3)

Statistical significance of the entropy concept, conditions of equilibrium, equilibrium of heterogeneous systems. Application of thermodynamic formalism to magnetic, electric, and solid systems; equilibrium of ionized gases; the Nernst postulate and the third law of thermodynamics. Prerequisite: graduate status.

281 **Nonequilibrium Thermodynamics** (3)

Limitations of equilibrium thermodynamics, entropy production, phenomenological equations and linear laws; postulates of nonequilibrium thermodynamics, formulation of the equations of nonequilibrium systems, statistical foundations, stationary nonequilibrium states; selected applications. Prerequisite: ME 280.

290 **Kinetic Theory of Gases** (3)

Equation of state and physical properties for gas composed of discrete particles; relation of kinetic theory to thermodynamics; Maxwell distribution of molecular velocities; Boltzmann H theorem. Molecular interactions, free paths, collision rates, scattering coefficients. Introduction to diffusion, viscosity, heat conduction; imperfect gases; flow of gases at low density. Prerequisite: ME 280.

297 **Special Topics in Fluid Mechanics** (3)

Prerequisite: approval of Department.

298 **Research** (arr.)

Research as arranged. May be repeated for credit.

9-300 **Thesis Research** (3–3)

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit.

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit.

OPERATIONS RESEARCH

201 Survey of Operations Research Methods I (3)

Basic concepts and techniques of operations research as applied to problems in industrial, governmental, and military decision-making. Allocation models including the simplex procedure of linear programming, transportation and assignment models, queuing theory, inventory theory, game theory, and decision-making under uncertainty. Prerequisite: Ap S 115 or equivalent.

202 Survey of Operations Research Methods II (3)

Simulation, Monte Carlo techniques; networks; integer programming; introduction to nonlinear programming; dynamic programming; Markov chains; reliability and replacement. Prerequisite: OR 201 or equivalent.

English

Chairman: G.E. McCandlish, Professor of English; Stuart 407, Telephone 676-6180

Before students are registered in Engl 1, they are tested in the minimum essentials of vocabulary, spelling, grammar, standard usage, and writing skill. Those students who show marked superiority may, upon passing further tests, be exempted from one or both halves of the English Composition course; those who are inadequately prepared for Engl 1 will be assigned to *Basic English.* In lieu of *Basic English,* off-campus students may, if they desire, be given permission to register for Engl 1*x* on campus. Engl 1 or 1*x* is prerequisite to all other courses in English.

ENGLISH COMPOSITION

X Basic English (0)

Instruction, drill, and exercises in grammar, vocabulary, spelling, and mechanics in general; instruction and exercises in composition and reading. This course is designed to prepare students for Engl 1. No academic credit. Tuition fee, $126.

1 English Composition: Language as Communication (3)

Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence, by analysis of selected current prose; library research procedure.

1*x* English Composition: Language as Communication (3)
(Campus Course)

Intensive course in English grammar and composition for students inadequately prepared for Engl 1. Begins with detailed instruction, drill, and exercises in basic structure of the English language and in writing paragraphs; continues with content of Engl 1. Engl 1*x* meets five hours a week and carries 3 semester hours of credit. Total fee, $283 (tuition of $258 plus additional fee of $25).

2 English Composition: Language and the Arts and Sciences (3)

Study and practice of expository and argumentative techniques; emphasis on the rhetorical complexities of the sentence and of diction, and on logical thought, by analysis of selected books on the nature of language and of the arts and sciences. Prerequisite: Engl 1 or 1*x*.

11 **The Writing of Reports** (3)

Theory and practice in the writing of technical reports. Prerequisite: Engl 1 or 1*x* and 2.

UMANITIES

43–44 **Classical Humanities** (3–3)

Interdisciplinary study of the origins of Western thought. Reading and intensive class discussions of selections from the Bible and of five works each semester from the following authors: Homer, Hesiod, Aristophanes, Plato, Aristotle, Aeschylus, Euripides, Sophocles, Herodotus, Thucydides, Lucretius, Marcus Aurelius, Epictetus, Polybius, St. Augustine. Background lectures on the major intellectual, artistic, economic, and social movements.

45–46 **Humanities in the Modern World** (3–3)

Interdisciplinary study of modern Western thought from the Renaissance to the 20th century. Reading and intensive class discussion of five works each semester from the following authors: Machiavelli, Pope, Voltaire, Rousseau, Goethe, Tolstoy, J.S. Mill, Zola, Nietzsche, Kierkegaard, Freud, Kafka, Koestler, T.S. Eliot. Background lectures on the major intellectual, artistic, economic, and social movements.

GLISH LITERATURE

51–52 **Introduction to English Literature** (3–3)

Historical survey.

91–92 **Introduction to European Literature** (3–3)

Consideration of various types.

115 **Introduction to English Linguistics** (3)

Development of the English language in a historical treatment of English grammar.

ERICAN LITERATURE

71–72 **Introduction to American Literature** (3–3)

Historical survey. Engl 71: from the beginnings to the Civil War. Engl 72: from the Civil War to present.

175 **Special Topics in American Literature** (3)

Autobiography as literature. A broad survey on the varieties of autobiographical work in American literature.

demiology and Environmental Health

rman: J.W. Millar, Vivian Gill Professor of Epidemiology and Environmental h; Ross Hall, Telephone 331-6117

1 **Principles of Environmental Health I** (2)

Communicable disease: recognition, mode of spread, general methods of control, immunization, quarantine, disinfectants, and insecticides.

2 **Principles of Environmental Health II** (2)

Water, its relationship to man's well-being. Disposal of human wastes—excreta and refuse; atmospheric pollution.

3 **Principles of Environmental Health III** (2)

Food, housing (urban and rural), institutional sanitation, radiological sanitation, insect vector, and rodent control.

101 **Environmental Sanitary Science I** (2)

Water: general characteristics (urban and rural), treatment and distribution; public bathing place sanitation; design and function of water treatment facilities.

102 **Environmental Sanitary Science II** (2)

Recognition and control of environmental pollution. Treatment and disposal of human wastes—excreta, refuse, and air.

103 **Environmental Sanitary Science III** (2)

Dairy products and food sanitation; processing, storage, and distribution of food. Supervision and training of personnel involved with food and the food industry.

104 **Environmental Sanitary Science IV** (2)

Housing, urban and institutional; heating, ventilation, lighting, and noise. Study of federal and municipal regulatory aspects.

105 **Air Pollution Abatement** (2)

Association of air pollution and disease and the effects of major pollutants on man. Air measurement and air measurement techniques demonstrated.

106 **Environmental Science of Nosocomial Infection** (1)

Developing a surveillance protocol for nosocomial infection. Microbiological assay of the animate and inanimate components of the hospital environment.

121 **Environmental Biostatistics** (2)

Statistical reasoning, collection of data, rates, incidence, and prevalence. Generalization of observations and use of measurement data.

122 **Environmental Epidemiology I** (2)

Infectious diseases: bacterial, viral, rickettsial, protozoal, and helminthic.

123 **Environmental Epidemiology II** (2)

Zoonoses, deficiency diseases, chronic disease, pneumoconiosis, mental health, maternal and child health.

131 **Environmental Epidemiology III** (1)

Venereal disease: etiology, clinical manifestations, diagnosis; prevention and control of syphilis, gonorrhea, chancroid, granuloma inquinale, and LGV.

141 **Public Health Entomology I** (2)

How the arthropods affect man. Study of host-parasite vector relationships; principles of systematic biology and basic insect taxonomy and toxicology.

142 **Public Health Entomology II** (2)

Identification, life cycles, and bionomics of medically important insects and other arthropods.

143 **Public Health Entomology III** (1)

Study of chemical, biological, and mechanical control of all medically important arthropods.

144 **Public Health Entomology IV** (1)

Prevention and control of rodent infestation; identification, habits, and relationship to man.

151 **Public Health Microbiology I** (3)

Medical parasitology, protozoology (intestinal), the Haemosporidia (malaria), the Haemoflagellates and the metoza (helminths) of medical importance.

152 **Public Health Microbiology II** (2)

Clinical bacteriology, characteristics and identification of the bacteria involved in disease, study of rickettsia and viruses.

153 **Public Health Microbiology III** (2)

Study and identification of the flora of water, dairy products, food, and the atmosphere.

154 **Public Health Microbiology IV** (1)

Mycology: study of medically important fungi, systematic mycoses and dermatomycoses.

171 **Industrial Hygiene I** (2)

Chemical hazards: study of diseases from chemical exposure, toxic dusts, metal fumes and vapors, gases, and organic compounds.

172 **Industrial Hygiene II** (2)

Physical hazards: biological effects of low and high temperatures, radiation (electromagnetic, ultraviolet, ionizing), illumination, sound, pressure, and atmospheric pollution.

191 **Public Health Administration I** (1 to 3)

Activities and organization; philosophy, background, and development. Public health activities include vital statistics, laboratory services, education, nursing, and social services.

192 **Public Health Administration II** (1 to 3)

Administrative considerations, including governmental aspects, legal considerations, fiscal management, personnel factors, and public relations in public health organizations. Prerequisite: Epid 191.

231 **Veneral Disease in the Community** (3)

A survey course to develop an understanding of venereal disease problems. Etiology, clinical manifestations, diagnosis, prevention, and control. For parents, school teachers, health personnel, and other educators.

254 **Human Ecology** (3)

Ecology—man within the framework of reference—physical and cultural

anthropology, geography, sociology, urban planning, public health, and public administration.

293 **Public Health and School Health Methods and Activities** (3)

Relationship between public health and school health. The purpose of the course is to aid the teacher in presenting information in the classroom setting.

Forensic Science

Chairman: T.P. Perros, Professor of Chemistry; Samson 205, Telephone 676-6480, or E-30, Telephone 676-7320

201 **Forensic Science in Law Enforcement I: Serology, Microscopy, Mineralogy** (3)

Principles in forensic serology; microscopic and optical analyses of human and animal reproductive cells, hairs, natural and synthetic fibers, and materials of a mineral nature.

202 **Forensic Science in Law Enforcement II: Instrumental Analysis** (3)

Principles and application of various instrumental methods to the examination of criminal evidence, including chromatographic and spectrophotometric techniques and mass spectrometry.

203 **Forensic Science in Law Enforcement III: Examination of Questioned Documents** (3)

Theory and principles of handwriting and handprinting, duplicating processes, paper manufacture, and fiber analysis; studies of paper and methods of examination of questioned documents.

204 **Forensic Science in Law Enforcement IV: Firearms and Tool-mark Identification** (3)

Study of methods for identifying firearms, cartridge casings, tool marks, tire marks, and footprints of significance in criminal procedures.

205 **Survey of Forensic Science** (3)

Survey of some areas of contemporary forensic sciences.

214 **Forensic Psychiatry** (3)

Introduction to the constructs of dynamic psychiatry, the psychiatric evaluation, and the nomenclature of mental disorders. Consideration of expert testimony in hospitalization and criminal cases.

224 **Introductory Criminal Procedure, Evidence and Legal Methods** (3)

Principles of criminal procedure, preparation and presentation of evidence, examination of witnesses, and the methods of legal research.

225 **Advanced Criminal Evidence** (3)

Study of procedural rules affecting the collection, accessibility, and use of physical evidence with emphasis on court opinions defining the rules of search and seizure. Prerequisite: ForS 224.

*226 **The Crime Lab, the Forensic Scientist, and the Criminal Lawyer** (3)

Qualifications and preparation of an expert witness and the relationships and responsibilities of the expert in court in criminal and civil cases. Prerequisite: ForS 224.

*227 **Advanced Criminal Procedure** (3)

Decision to arrest, prosecutive discretion, bail, the preliminary hearing, right to a speedy trial, discovery, plea bargaining, publicity, post-conviction procedures. Prerequisite: ForS 224.

*228 **Administration of Criminal Justice** (3)

Consideration and analysis of selected advanced problems in the administration of criminal justice. Emphasis will be placed on the role and professional responsibilities of prosecutor and defense counsel and on development trends in the law. Prerequisite: ForS 224.

*229 **The Police and the Community** (3)

Problems and potential of contemporary urban law enforcement: the role and perspective of the police officer. Prerequisite: ForS 224.

*231 **Law and Criminology I: Search for the Causes of Criminal Behavior** (3)

Role which knowledge of crime causation may play in assessing devices to control deviant behavior: factors related to criminal behavior; current causal theories. Prerequisite: ForS 224.

*232 **Law and Criminology II: Society's Responses to the Criminal Offender** (3)

Study of punitive, mechanical, and correctional approaches to offenders. Emphasis on changing responses to criminal and delinquent behavior, and research on effectiveness. Prerequisite: ForS 224.

*233 **Post-conviction Dispositions—Dynamics of the Law of Criminal Corrections** (3)

Study of statutes, practice, problems and potential of alternatives facing a defendant: mental fitness to proceed to trial, probation, sentencing, parole, prisoner rights. Prerequisite: ForS 224.

254 **Seminar: Recent Developments in Forensic Science** (2)

Study of current advances and problems in law and science relating to forensic science.

260 **Introduction to Human Physiology and Pathology** (2)

Introduction to physiology and pathology of the human body; emphasis on medical terminology. Basic understanding of the body functions in health and disease.

261 **Introduction to Forensic Pathology** (2)

Precise terminology and scientific techniques used in medicolegal investigations: sudden or unexpected deaths, homicides, suicides, accidental deaths, and trauma.

*pecial circumstances, students may take similar courses in the National Law Center with the approval of the Dean of the National Law Center.

262 Current Trends in Forensic Pathology and Forensic Odontology (3)
Emphasis on (1) the relationship among law, medicine, and law enforcement; and (2) the advancement of forensic knowledge.

263 Seminar: Law, Medicine, and Forensic Sciences (3)
The relationship of the forensic sciences to the fields of law, medicine, and law enforcement.

264 Medical Jurisprudence (3)
Legal problems inherent in the practice of medicine. Laws regulating health personnel and health industry. Emphasis on professional liability.

265 Criminal Procedure in Forensic Medicine (2)
Problems in the use of evidence in criminal proceedings; emphasis on the use of medical and related evidence.

266 Forensic Neuropathology (3)
Fundamentals of neuropathology of natural disease and traumatic injuries of the nervous system, including demonstrations of gross pathologic specimens.

267 Applications of Histochemistry to the Forensic Sciences (3)
Chemical and physical methods for the localization, identification, and characterization of materials under the microscope, including carbohydrates, enzymes, lipids, minerals, pigments, and proteins.

268 Photography in the Forensic Sciences (2)
Basic use of forensic photography, including selection and use of equipment, photographs as evidence, close-up work, and common misconceptions.

269 Principles of Forensic Toxicology (2)
Analytical procedures used for the detection of drugs, poisons, and toxic agents in biological specimens. Admission by permission of instructor.

295 Research (arr.)
Open to qualified Master's degree students. Research on problems approved by the departmental adviser.

299–300 Thesis Research (3–3)

French*

Chairman: J.F. Burks, Professor of French; A-11, Telephone 676-6330

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

* Administered by the Department of Romance Languages and Literatures.

1–2 **First-year French** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Fren 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern French prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester.

3–4 **Second-year French** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Fren 4. Conversation, grammar, composition, reading in modern French prose, introduction to French civilization. Aural training, oral practice in language laboratory. Prerequisite: Fren 1–2, or two years of high school French. Laboratory fee, $17.50 a semester.

eodesy*

ogram Adviser: Hyman Orlin, Professorial Lecturer in Geodetic and Cartographic ience; Telephone 946-3557

12 **Plane Surveying** (3)

Theory and practice in measurement of distances, angles, and elevations; traversing, leveling, and triangulation; stadia surveying, plane coordinate computations, and miscellaneous surveying problems. Prerequisite: Math 6 or equivalent.

13 **Geodetic Surveying** (3)

Elements of geodetic and hydrographic surveys; electronic measurements, triangulation, trilateration, and precise traverses; geodetic leveling and precise trigonometric leveling; introduction to geodetic astronomy and to least squares adjustment. Prerequisite: Geod 12 or permission of instructor.

17 **Elementary Photogrammetry** (3)

Fundamentals of aerial photography, photogrammetric optics, and photographic processes; mathematics of vertical and tilted photographs; stereoscopy and parallax; planning and executing the photogrammetric project; radial triangulation methods; photomaps; oblique and terrestrial photography. Prerequisite: Cart 2, Geod 12; or permission of instructor.

18 **Intermediate Photogrammetry** (3)

Basic photogrammetry theory and practice. Stereoscopic plotting instruments; graphical and computational methods for adjusting strips of aerotriangulation; electronic computers. Method of least squares applied to photogrammetry. Prerequisite: Geod 17.

110 **Map Projections** (3)

Mathematics of projections; geometry of sphere and ellipsoid; distortions; conic, cylindrical, and azimuthal projections; geodetic projections. Prerequisite: Math 32.

117 **Advanced Photogrammetry** (3)

Analytic photogrammetry. Prerequisite: Geod 18, Math 33.

liated with the Department of Geography and Regional Science.

155 **Elementary Geodesy** (3)

Principles and formulas basic to theoretical and applied geodesy, with application to special problems; computations on an ellipsoid, gravimetry, deflection of the vertical and Laplace's equation, introduction to satellite geodesy. Prerequisite: Geod 13, Math 32; or permission of instructor.

156 **Geodetic Astronomy** (3)

Principles and formulas for the astronomic determination of longitude, time, azimuth, and latitude; star catalogues; observing and time-recording instruments; practice in observing and computation. Prerequisite: Geod 13, Math 32; or permission of instructor.

160 **Mathematics of Adjustments and Least Squares** (3)

Types and distribution of errors, Gaussian and Poisson distributions, fundamentals of matrix algebra with special emphasis on least squares adjustment. Prerequisite: Geod 155, Math 33.

161 **Adjustments in Geodesy and Photogrammetry** (3)

Adjustment theory and special adjustment problems. Prerequisite: Geod 160.

Geography and Regional Science

Chairman: Marvin Gordon, Professor of Geography and Regional Science; I-200, Telephone 676-6185

51 **Introduction to Geography** (3)

General survey of the various systematic, physical, and human fields of geography which play a role in the analysis and interpretation of man-environment relationships in both spatial and ecological contexts.

52 **Introduction to Economic Geography** (3)
(Formerly World Regional Patterns)

Examination of the basic principles which determine the location of economic activities on the surface of the earth.

126 **Economic Geography** (3)

Consideration of theories and hypotheses concerning the location of economic activities: services, manufacturing, and agricultural production. Exercises in computer-oriented locational analysis.

127 **Population and Settlement** (3)

Patterns of world population; factors contributing to population pressures, growth, and migrations.

132 **Resources and Environment** (3)

Analysis of the spatial pattern of resources and the problems created by man's utilization of unevenly distributed resources.

141 **Urban Settlement** (3)

Distribution of urbanization on the surface of the earth; processes which lead to urbanization; theories which can be used to analyze the location of cities.

145 **Cultural Geography** (3)

Analysis of the relationships between culture and environment; emphasis on spatial and ecological considerations.

146 **Political Geography** (3)

Analysis of the interrelationships between the political community and the human and physical environment.

148 **Principles of Geography** (3)

Study of geographic principles, technology and tools designed to meet specific needs of teachers. Emphasis on the practical application of geographic concepts and the use of source materials in the classroom.

155 **Africa** (3)

Survey of the cultural and physical regional patterns of Africa.

161 **Latin America** (3)

Examination of spatial characteristics of physical and cultural phenomena in Middle and South America.

208 **New Perspectives in Geography** (3)

An overview of recent trends in geographic research. Selected topics include diffusion processes, spatial behavior, locational analysis, and environmental perception.

224 **Seminar: Political Geography** (3)

Study of the spatial relationships between the political community and environment.

243 **Seminar: Urban Geography** (3)

Functional processes affecting the evolving morphology and internal spatial patterns of urban phenomena; emphasis on economic factors, behavioral considerations, and impact of time.

ology

irman: Geza Teleki, Professor of Geology; Bell 3, Telephone 676-6190

1–2 **Introductory Geology** (3–3) (Campus Course)

Lecture (2 hours), laboratory (2 hours), optional field trips. Survey covering the principles of geology; emphasis on man's effect on the environment. Laboratory fee, $12 a semester.

3 **Introductory Geology** (3)

Survey covering the principles of geology. Nonlaboratory course for off-campus students only.

4 **Introductory Geology** (3)

Geological periods, evolution of life on earth. Nonlaboratory course for off-campus students only. Prerequisite: Geol 1 or 3, or permission of instructor.

125 **Marine Geology** (3) (Campus Course)

Lecture and map work. Principles of oceanography and submarine geology; topography, crustal structure, sedimentary processes, and marine environment. Prerequisite: Geol 1–2.

141 **Introductory Geochemistry** (3) (Campus Course)

Lecture (2 hours), laboratory as arranged. Principles and theories on the abundance, relationships, and distribution of the elements in various rock and mineral species. Prerequisite or concurrent registration: Geol 117 and 118, or equivalent; Chem 11–12; Math 30; Phys 1, 2; or permission of instructor. Laboratory fee, $12.

Geophysics*

Program Adviser: Hyman Orlin, Professorial Lecturer in Geodetic and Cartographic Science; Telephone 946-3557

105 **Elementary Geophysics** (3)

Introduction to geophysics; origin of the earth, geochronology, seismology, gravity, and geomagnetism. Prerequisite: Geol 1 or 3, Math 32; or permission of instructor.

106 **Interpretation Theory—Geophysics** (3)

Development of mathematical and physical foundations for interpreting seismic, gravimetric, and magnetic data. Prerequisite: Geop 105.

115 **Elementary Seismology** (3)

Principles of seismographs; analysis of stress and strain, interpretation of earthquake seismograms, location of earthquakes; seismic waves in the earth and the structure of the earth's interior as deduced from geophysical data, earthquake magnitude energy and intensity, seismic risk and the effects of earthquakes, review of earthquake activity throughout the world. Prerequisite: Geop 105.

Germanic Languages and Literatures

Chairman: Carl Steiner, Associate Professor of German; Rice 404, Telephone 676-6195

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year German** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Germ 2. Essentials of German grammar; reading of easy prose. Aural-oral practice in language laboratory. Laboratory fee, $17.50 a semester.

* Affiliated with the Department of Geography and Regional Science.

3–4 **Second-year German** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Germ 4. Selections from modern German prose; continuation and review of grammar. Aural-oral practice in language laboratory. Prerequisite: Germ 1–2 or equivalent. Laboratory fee, $17.50 a semester.

ealth Care Administration

airman: Leon Gintzig, Professor of Hospital Administration; Binney 21, Telephone 6-6220

153–54 **Survey of Health Care Organization and Procedures** (3–3)

Introduction to the history, concepts, and activities of health care systems in this country. Emphasis on organization and procedures. Prerequisite to HCA 154: HCA 153 or permission of instructor. Not open to Master's degree candidates in Health Care Administration.

202 **Introduction to Health Care** (3)

Lecture and discussion (2 hours), laboratory (2 hours). Survey of organization, functions, trends, and issues among governmental, nongovernmental, voluntary sectors; survey of major diseases by organ systems and their impact on administration and planning; medical terminology.

203 **Health Care Organization and Management** (3)

Lecture and discussion (2 hours), laboratory (2 hours). History and current character of institutional health care. Organizational functions and structure of various kinds of health care facilities. Prerequisite or concurrent registration: Mgt 201.

205 **Hospital Management Procedures** (3)

Lecture and discussion (2 hours), laboratory (2 hours). Departmental administration. Survey of hospital law; hospital forms, procedures, and systems; and hospital programs pertaining to disaster relief, safety, fire prevention.

209 **Health Care Economics and Financial Management** (3)

Lecture (2 hours), laboratory (2 hours). Economic and financial analysis of the interactions between consumers and providers of health care, and public and private prepayment and insurance programs. Industry price structure and the long- and short-term capital requirements.

250 **Delivery of Mental Health Services** (3)
(Formerly Mental Health Facilities and Resources)

Study of the organizations and systems for the delivery of mental health services; emphasis on administration, management, and financial support of treatment and rehabilitation facilties.

Hebrew*

Chairman: J.E. Ziolkowski, Associate Professor of Classics; T-22, Telephone 676-6127

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

21–22 **Beginning Hebrew** (3–3) (Campus Course)
(Formerly First-year Hebrew)
A year course: credit toward a degree at this University given on completion of Clas 22. Elementary Hebrew grammar, readings from the Old Testament and contemporary literature, composition and conversation.

23–24 **Intermediate Hebrew** (3–3) (Campus Course)
(Formerly Second-year Hebrew)
Review of grammar; continued development of reading comprehension, composition, and conversation.

History

Chairman: R.W. Kenny, Professor of History; Stuart 419, Telephone 676-6230

Departmental prerequisite: Hist 39–40 or 91–92 is prerequisite to courses 108 through 158 and 187 through 196; Hist 71–72, to courses 167 through 186; either Hist 39–40, 71–72, or 91–92, to courses 161 through 166. Prerequisite to Hist 105–6 is either Hist 39–40, 91–92, or a background in a science. Students may waive one or more of the prerequisite courses by passing a departmental waiver examination, by attaining scores of 600 or above on the College Entrance Examination Board Achievement tests, or by good performance on Advanced Placement Examinations.

39–40 **European Civilization in Its World Context** (3–3)
Hist 39: political, social, economic, and cultural history to early modern era. Hist 40: from early modern era to present. Students who receive credit for Hist 39–40 cannot receive credit for Hist 91–92.

71–72 **Introduction to American History** (3–3)
Hist 71: political, social, economic, and cultural forces of the United States in their world setting from 1492 to 1861. Hist 72: from 1861 to present.

91–92 **World Civilizations** (3–3)
Hist 91: major civilizations of the world to 1500. Hist 92: Europocentric and world civilization since 1500. Students who receive credit for Hist 91–92 cannot receive credit for Hist 39–40.

131 **History of Germany** (3)
Political, social, and cultural development from Reformation to unification.

* Administered by the Department of Classics.

138 **History of World Communism** (3)

The international communist movement from its beginnings to the present.

145 **History of Russia: 18th and 19th Centuries** (3)

From the reign of Peter the Great to the Russian Revolution.

146 **History of Russia: Soviet Russia** (3)

Revolution and Soviet rule to the present.

149–50 **European Diplomatic History** (3–3)

Emphasis on policies and actions of the great powers and their statesmen. Hist 149: to 1890. Hist 150: since 1890. Students who receive credit for Hist 150 cannot receive credit for Hist 157.

163–64 **History of Latin America** (3–3)

Political, social, and cultural development. Hist 163: through independence. Hist 164: the national period.

181–82 **U.S. Diplomatic History** (3–3)

Survey of American foreign relations from the era of the American Revolution. Hist 181: to 1898. Hist 182: 20th century.

183 **Oversea Expansion of the United States** (3)

Political, economic, social, and cultural life of our outlying possessions.

195–96 **History of East Asia** (3–3)

Civilizations of China and Japan; emphasis on institutional development. Hist 195: beginnings to about 1800. Hist 196: from eve of the modern era to present.

201 **History and Historians** (3)

Students who receive credit for Hist 201 cannot receive credit for Hist 199.

lian*

irman: J.F. Burks, Professor of French; A-11, Telephone 676-6330

lacement Examination: A student who has not been granted advanced standand who wishes to continue in college the language begun in high school must a placement examination before registration. Upon completion of the examinaassignment is made to the appropriate course.

1–2 **First-year Italian** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Ital 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern Italian prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester.

3–4 **Second-year Italian** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Ital 4. Conversation, grammar, composition, reading of modern Italian prose, introduction to Italian civilization. Aural training, oral

inistered by the Department of Romance Languages and Literatures.

practice in language laboratory. Prerequisite: Ital 1–2 or two years of high school Italian. Laboratory fee, $17.50 a semester.

Journalism

Chairman: R.C. Willson, Associate Professor of Journalism; Stuart 300A, Telephone 676-6225

145 **Principles and Problems of Public Relations** (3)

Principles, problems, and ethics of public relations for government agencies, commercial establishments, educational and other public institutions. Case histories of successful programs.

Latin American Civilization—Special Program

Program Director: R.C. Burns; Building LL, Telephone 676-7049
Faculty Consultants: C.E. Galbreath, Professor of International Economics; Marvin Gordon, Professor of Geography and Regional Science; P.F. Klarén, Assistant Professor of History; J.W. Robb, Professor of Romance Languages; B.M. Sapin, Professor of International Affairs and Political Science; K.L. Storrs, Assistant Professor of Political Science.

101 **Latin American Civilization** (3)

A three-week, University-conducted study program in a selected area in Latin America, effecting a broad synthesis of history, politics, economy, geography, language, and literature in order to achieve an understanding of contemporary problems and assess national attitudes in the light of world relations. On-the-spot seminars, guest lectures at universities, instructional visits to government offices, first-hand observation of each country and the operation of its economy, comparisons and contrasts among the countries of the area. May be repeated for credit.

Management Science

Chairman: E.K. Winslow, Associate Professor of Behavioral Sciences; Government 201, Telephone 676-7375

118 **Introduction to Information Processing** (3)
(Formerly Introduction to Data Processing)

Basic principles and methods. A management-oriented introduction to the fundamentals, potentials, and problems of computer-based data processing as a tool for record-keeping, resource-controlling, and decision-making.

119 **Computer Programming for Information Systems** (3)
(Formerly Data Processing Programming)

Programming concepts, techniques, and practices. Introduction to the concepts and techniques of computer programming using the FORTRAN and

COBOL languages. Emphasis placed on development and understanding of the logic necessary to solve business data processing and management science problems on a third generation digital computer. Student programs are run on the University's IBM 370 computer. Prerequisite: Mgt 118.

120 **Information Systems Development I** (3)
(Formerly Data Processing Systems)

Assessment of the systems concept and its relationship to organizational information decision-making and management. Concepts and techniques involved in the initial development of new or revised computer-based information systems, e.g., systems analysis and design phases. Prerequisite: Mgt 118, 119; or permission of instructor.

121 **Information Systems Development II** (3)

A further examination of the information systems development process, including concepts and techniques for assessment, selection, introduction, operation, and maintenance of a newly designed automated information system. Prerequisite: Mgt 120 or permission of instructor.

201 **Advanced Administrative Management** (3)

Principles and practices common to administrative units of all kinds.

203 **Mathematics for Management** (3)

Mathematical concepts employed in the solution of management problems. Applications of analytical geometry, functions, elements of calculus, and linear algebra to optimization problems. Prerequisite: algebra.

204 **Quantitative Factors in Administration** (3)

Survey of quantitative techniques used in the solution of management problems. Potentials and limitations of mathematical models and proper areas for their application. Topics include probability, statistical decision theory, linear programming, waiting line, inventory replacement models.

207 **Human Behavior in Organizations** (3)

Individual, group, intergroup, and other human behavior and development; application of social science research to administration. Learning exercises and practical applications emphasized.

208 **Current Issues in Organizational Behavior** (3) (Campus Course)

Study of behavioral factors relating to issues such as automation, ethics, interpersonal relations, organizational change, and similar problems. Problems in behavioral science research. Prerequisite: Mgt 207.

210 **Behavioral Factors in the Process of Change** (3) (Campus Course)

Review of current research, theory, and practice related to the process of change. Basic principles of planned change; individual, group, organization, community and cultural change. Emphasis on human behavior research and theory related to the change process. Prerequisite: Mgt 208.

212 **Organizational Development: Concepts and Methods** (3) (Campus Course)

Primarily for doctoral students. Examination of different concepts of organizational structure, processes, and growth. Models of organizational change will be developed with a taxonomy of methods of initiating action to further organizational development. The methods of action, research,

team building, confrontation methods, objectives analysis, survey research, and structural revision will be related to organizational development processes. Prerequisite: Mgt 210 or equivalent.

213 **Consultative Processes in Organizations** (3) (Campus Course)

Primarily for doctoral students. Examination through actual practice as well as theory of the nature of the helping process between one person or group and another person or group. Dynamics of the consulting process will be explored as well as role differences in internal and external consultation. Development of skill in the helping relationship will be furthered within the framework of interpersonal relation concepts and laboratory experiences. Prerequisite: Mgt 210 or equivalent.

224 **Theory and Management of Systems** (3)

Introduction to systems theory and qualitative systems analysis. Analysis of systems in organizations and their impact on management: systems point of view, enterprise as a system, effect of technical and management systems on organization structure, information-decision systems, systems design, and dynamic aspects of organizational systems. Prerequisite: Mgt 201, 204 or 225 (off campus), 207.

225 **Managerial Statistics I** (3)

(Formerly Introduction to Managerial Statistics)

The mathematics of probability and statistics and its applications in management science and operations research. Topics include random variables; discrete and continuous probability distributions; moments and other descriptive measures; sampling theory; and an introduction to statistical estimation, hypothesis testing, and regression analysis. Prerequisite: Mgt 203 or equivalent.

226 **Managerial Statistics II** (3)

Management applications of the theory and techniques of mathematical statistics. Topics include maximum likelihood and other methods of estimation, hypothesis testing, descriptive measures of bivariate distributions, regression and correlation, analysis of time series, econometric models and multiple regression, statistical decision theory, and the revision of probabilities in decision-making. Prerequisite: Mgt 225.

227 **Mathematical Programming: Techniques and Applications** (3)

Technical and management considerations of linear and nonlinear programming. Mathematical and computational aspects of linear programming. Formulation of linear programming models. Studies of applications of linear programming. Introduction to theory and application of nonlinear programming. Prerequisite: Mgt 203 or equivalent.

228 **Techniques of Operations Research** (3)

(Formerly Systems Analysis by Simulation)

Survey and introduction to contemporary operations research techniques. Analytical methods such as simulation, queuing, Markov chains, dynamic programming, game theory, and network flows. Prerequisite: Mgt 225, 227.

229 **Seminar: Management Science and Operations Research** (3)

Supervised study in depth and advanced projects in management science and operations research. Prerequisite: Mgt 226, 227; or permission of instructor.

230 **Administration of Research and Development** (3)

Examination of technological, political, and economic factors affecting the R&D environment; operational aspects; management problems in military, governmental, and industrial organizations; project selection, resource allocation, personnel, planning and control, measurement and evaluation.

240 **Survey of Information Technology** (3)
(Formerly Mgt 218 Survey of Data Processing)

A management-oriented presentation of the vocabulary, concepts, and trends in computer hardware and software, information systems design and development, organizational impact, and effective management; milestones of past and current research; computer technology as a rapidly evolving force of major significance in business, government, and industry. Designed for students without prior information technology experience and who do not plan to take additional information courses.

241 **Management Information Systems Development and Application** (3)
(Formerly Mgt 221)

Contemporary theories and practices in the development of management information systems. Participation in the design of information systems specifications. The roles of both management and systems design personnel in the systems development process studied and evaluated. Impact of management information systems upon the organization and its decision-making processes evaluated. Case studies. Prerequisite: an introductory course in information technology, or permission of instructor.

242 **Comparative Computer Systems** (3)
(Formerly Mgt 220 Comparative Digital Computer Systems and Their Management)

Characteristics and capacities of the range of information processing equipment in use today. Recent and prospective equipment and software development. Selection of computers and related software and equipment. Prerequisite: Mgt 241 or permission of instructor.

243 **Management of Information Technology** (3)
(Formerly Mgt 223 Management of a Data Processing Organization)

Advanced course; emphasis on principles, practices, and trends in the management of information technology. Topics include the role and control of an information processing installation; trends, new hardware, and advanced technology in the computing milieu and their implications for information processing management; and analysis of the performance of the data processing activity internally and externally, according to developed criteria. Case studies. Prerequisite: Mgt 241, 242; or permission of instructor.

244 **Information Systems and Telecommunication** (3)

Study of the growing linkages among the technology of information processing, information transmission, and organization management—computers, communications, and managers—from two points of view: (1) new potentials for improved management, and (2) solving new problems of informations systems design, implementation, and operation. Admission by permission of instructor.

245 **Data Base Management** (3)

An in-depth approach to the understanding and use of the latest techniques for developing and implementing an effective data base system.

Topics include data base organization, creation, and maintenance; effe and economic justification; evaluation criteria; standardization of data ba systems; impact of packaged data management systems; and an analysis o the current state-of-the-art in data base development. Prerequisite: Mg 119, 241.

249 **Seminar: Information Technology** (3)
(Formerly Mgt 222 Seminar: Advanced Digital Computer Concepts)

Current problems in the design and implementation of computer-base systems; emphasis on current state-of-the-art through discussion with lead ing experts in the field, analysis of literature. Prerequisite: Mgt 241, 242 243; or permission of instructor.

262 **Seminar: Contemporary Administrative Theory** (3) (Campus Course)

Primarily for doctoral students. Current and prospective theory and prac tice from an inter- and trans-disciplinary viewpoint. Topics include gen eral systems theory, game theory, axiology and management values, anti thetics, value engineering, cybernetic systems, decision theory, innovation and creativity models, and general semantics. Prerequisite: Mgt 201, 204 207, 224.

*280–81
–82 **Managerial Aspects of National Security** (3 or 4–3 or 4–3)

The application of business management principles to the military aspects of national security; organization and administration of the federal govern ment for national defense; management of national resources (natural, hu man, energy, economic); budgeting and controllership; determination of requirements; procurement; production; supply management; and commu nications.

295 **Research Methods** (3)

Research techniques, sources of information, array and analysis of data, interpretation and presentation of the findings.

Mathematics

Chairman: T.P.G. Liverman, Professor of Mathematics; Library 719J, Telephone 676-6235

No Mathematics courses numbered 1 to 100 are available for college credit if the student's previous training in mathematics meets the prerequisite for a higher num bered course.

Graduate credit may not be given for Mathematics courses numbered from 101 to 200 without the permission of the Chairman of the Department.

3 **College Algebra** (3)

Equivalent to the standard two years of high school algebra with several additional topics. Prerequisite: one year each of high school algebra and high school geometry.

* Available only to students in the Master of Science in Administration program at the Industrial College of the Armed Forces.

6 **Plane Trigonometry** (3)

Prerequisite: two years of high school algebra and one year of high school geometry, or Math 3 (or concurrent registration therefor).

9 **General Mathematics I** (3)

For students electing Math 9 and 10 as a terminal sequence. Logic, sets, number systems. Prerequisite: two years of high school mathematics.

10 **General Mathematics II** (3)

Mathematical systems, geometry, and introduction to statistics and probability. Prerequisite: Math 9.

30 **Precalculus** (3)

Set theory, inequalities, basic analytic geometry, functions and relations. Polynominal, trigonometric, logarithmic, and exponential functions. Prerequisite: Math 3 and 6; or one and one-half years of high school algebra, one year of high school geometry, and one-half year of high school trigonometry; or equivalent. Prior to registration, new students should take a placement examination in algebra and trigonometry.

31 **Calculus of One Variable** (3)

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30 or equivalent. Math 30 may be waived as a prerequisite by examination on scheduled dates.

32 **Calculus of Several Variables** (3)

Vectors, determinants, partial derivatives, multiple integrals, curves. Prerequisite: Math 31.

33 **Calculus of Vector Functions** (3)

Differential equations, infinite series, vector calculus, line integrals, Green and Stokes theorems. Prerequisite: Math 32.

51 **Mathematics for the Social and Management Sciences I** (3)

Notion of function, graph of function, and sequences; differential and integral calculus of functions of one variable; exponential and logarithmic functions. New students should take a placement examination in algebra prior to registration.

52 **Mathematics for the Social and Management Sciences II** (3)

Functions of several variables; partial derivatives, maxima and minima Lagrange multipliers; systems of linear equations and inequalities; matrix algebra, determinants, rudiments of linear programming. Prerequisite: Math 51.

111 **Mathematics for Engineers and Physicists I** (3)

Differential equations, linear algebra, Fourier series and integral. Prerequisite: Math 32.

112 **Mathematics for Engineers and Physicists II** (3)

Fourier integral, Fourier series, partial differential equations. Prerequisite: Math 111.

124 **Introduction to Matrix Theory** (3)

Operations on matrices, linear equations, matrix inversion, vector spaces, characteristic roots and vectors, spectral theorem, quadratic forms. Prerequisite: Math 31.

134 **Introduction to Boundary-value Problems** (3)

Prerequisite: Math 111 or 142.

139 **Advanced Calculus I** (3)

Review and extension of elementary one-variable calculus, emphasis on the theoretical foundations; differential calculus of several variables. Prerequisite: Math 33.

140 **Advanced Calculus II** (3)

Differential and integral calculus of several variables; contraction maps, implicit function and differential equation theorems. Prerequisite: Math 139 or equivalent.

153 **Introduction to Numerical Analysis** (3)

Introduction to fundamentals of numerical analysis using modern digital computers. Solution of linear systems and of ordinary differential equations. Interpolation polynomials. Iterative solution of nonlinear equations. Simple quadrature techniques. Prerequisite: Math 111 or 139, or equivalent.

*160 **Introduction to Abstract Algebra for Teachers** (3)

Basic algebraic structures, such as groups, rings, integral domains, and fields; properties of integers and rational numbers. Prerequisite: Math 31 or equivalent.

*161 **Introduction to Linear Algebra for Teachers** (3)

Linear functions, solution of equations, quadratic forms, change of basis. Prerequisite: Math 31 or equivalent.

*164 **Foundations of Mathematics for Teachers** (3)

Logic, set-theory, and foundations of the real number system. Prerequisite: Math 31 or equivalent.

171 **Vector Analysis** (3)

Microbiology

Chairman: L.F. Affronti, Professor of Microbiology; Ross Hall, Telephone 331-6531

†237 **Immunity and Infection** (1)
(Formerly Dental Immunology)

Fundamental immunologic concepts. Emphasis on serologic, biochemical, and immunologic procedures as applied to clinical and research situations.

* Open only to candidates for the degree of Master of Science for Teachers, teachers for in-service training, or students recommended by the Department of Education.
† Open only to students in the program of study leading to the degree of Master of Science in Special Studies with a concentration in Oral Biology.

*238 **Advanced Dental Immunology** (1)

Advanced immunologic concepts related to physiological and biochemical bases of dental disease. Prerequisite: Micr 237.

Music

Chairman: George Steiner, Professor of Music; FF–10, Telephone 676-6245

3 **Introduction to Musical Understanding** (3)

Introductory history of musical styles, related to listening; elements and materials of music.

4 **Survey of Music Literature** (3)

Introductory study of musical forms, structures, and textures; aural analysis of selected literature.

Oceanography†

Program Adviser: Hyman Orlin, Professorial Lecturer in Geodetic and Cartographic Science; Telephone 946-3557

11 **Navigation** (3)

Theory of navigation, charts, navigation aids, celestial navigation, shipboard instruments.

101–2 **Elementary Oceanography** (3–3)

Chemical and physical properties and composition of sea water, heat budget, distribution of variables, statics, dynamics, water masses, general circulation of the oceans, underwater sound, propagation of light, submarine topography, sea floor deposits, biological classifications, and marine ecology. Spectrum of ocean waves from capillary through tidal, including internal waves. Observations and reduction; history and interrelationships between marine sciences. Prerequisite to Ocea 102: Geol 1 or 3, or permission of instructor.

110 **Physical Oceanography** (3)

All aspects of physical oceanography except waves and tides. Subjects of physical and chemical properties of sea water, underwater sound, and propagation of light. Emphasis on hydrodynamic equations, statics and kinematics, currents, heat budget, turbulence, and the general circulation and water masses of oceans. Prerequisite: Math 32, Ocea 101; or permission of instructor.

111 **Ocean Waves and Tides** (3)

All aspects of waves and tides; survey of tidal theory and analysis. Prerequisite: Math 32, Ocea 101.

† only to students in the program of study leading to the degree of Master of Science in Studies with a concentration in Oral Biology.
ated with the Department of Geography and Regional Science.

112 **Biological Oceanography** (3)
Biological science as related to marine environment. Prerequisite: Ocea 102.

113 **Marine Geophysics** (3)
Principles of geophysical measurements and interpretation, earthquake seismology, sound propagation, seismic refraction, and reflection at sea. Selected reflection and refraction studies offshore; geophysical investigations of some selected trenches. Prerequisite: Geop 105, Phys 1; or permission of instructor.

114 **Chemical Oceanography** (3)
Chemical processes in the marine environment, including composition of sea water, nutrients, natural composition and variation, carbonate cycle, geochemistry, and extraction. Prerequisite: Chem 12, Ocea 101; or permission of instructor.

115 **Geological Oceanography** (3)
Physiography of the sea floor and geological processes of the ocean basins and margins, properties and distribution of sediments and rates of deposition; distribution of minerals, structure and origin of the ocean basins. Prerequisite: Ocea 102.

Oral Biology

Program Adviser: E.A. Caress, Assistant Dean of the Graduate School of Arts and Sciences; Bacon 201, Telephone 676-6210

The courses listed below are open only to students in the program of study leading to the degree of Master of Science in Special Studies with a concentration in Oral Biology. This degree program is offered by the Graduate School of Arts and Sciences in cooperation with the Naval Graduate Dental School at the National Naval Medical Center, and the Army Institute of Dental Research at the Walter Reed Army Medical Center (see page 82).

201 **Research Methodology** (0)

202 **Oral Pathology** (3)

203 **Diagnosis** (3)

204 **Patient Management** (3)

205 **Topographic Anatomy of the Head and Neck and Anatomy of Medical Emergencies** (2)

206 **Hospital Dentistry** (1)

208 **Naval Administrative Management** (1)

260 **Biostatistics and Research Design I** (0)

261 **Biostatistics and Research Design II** (0)

262 **Military Management** (1)

263 **Behavior Modification Approaches to Dental Problems** (1)

265 **Analgesia** (1)

270 **Microanatomy of Normal and Pathologic Tissue I** (2)

271 **Microanatomy of Normal and Pathologic Tissue II** (3)

272 **Microbiology and Immunology** (3)

273–74 **Physiological Basis of Patient Treatment** (2–2)

275 **Dental Materials** (1)

276 **Seminar: Multidisciplinary Basic Science** (3)

295–96 **Research** (3–3)

harmacology

airman: H.G. Mandel, Professor of Pharmacology; Ross Hall, Telephone 331-6541

21–22 **Chemistry and Physics of Anesthesia** (3–3)

Fundamental concepts of physics, general and organic chemistry, and biochemistry and their application to medicine and anesthesiology, including chemistry of respiration, acid-base balance, clinical biochemistry and enzymology, hormones, radioisotopes, electronics, physicochemical properties of anesthetic agents, and other related topics.

110 **Pharmacological Basis of Anesthesia** (3)

Fundamental principles of pharmacology; drugs affecting the autonomic nervous system, central nervous system, and cardiovascular system; fundamentals of inhalation anesthesia; auxiliary drugs used in anesthesiology; other topics.

115 **Drug Abuse Education** (3)

Psychological and sociological bases of drug abuse, pharmacological and toxicological aspects of drug action on both the brain and peripheral organ systems, legal and societal implications of and reactions to drug abuse. Lectures and discussions on alcohol, narcotics, central nervous system stimulants and depressants, marijuana and other hallucinogenic and psychedelic drugs.

215 **Adolescent Drug Abuse** (3 or 4)

Multidisciplinary lectures and discussions concerning the physiological and psychological effects of narcotics, central nervous system stimulants and depressants, alcohol, and hallucinogenic and psychedelic drugs; psychosocial factors leading to adolescent drug abuse; legal implications of drug abuse; prevention, control, and treatment of drug abuse.

251 **Pharmacological Basis of Oral Therapeutics** (3)

Lectures and discussions on the clinical pharmacology of drugs used in the practice of dentistry; drug interactions; adverse reactions affecting the oral cavity.

Philosophy

Chairman: Thelma Z. Lavine, Elton Professor of Philosophy; Rice 611, Telephone 676-6266

50 **Introduction to Philosophy** (3)

Readings from major philosophers and study of philosophic positions from Plato to the present.

131 **Ethics** (3)

Theories of "the good" and "the right" from Plato to Sartre.

193 **Contemporary Philosophy: Phenomenological** (3)

The phenomenological movement, including its development into German and French existentialism, and its more recent phases.

Physical Education, Health, and Recreation

Chairman: J.L. Breen, Professor of Physical Education; K-20, Telephone 676-6280

101 **Physical Education in the Elementary School** (3)

For Elementary Education and Physical Education majors. Child growth and development related to school and playground programs in movement. Philosophy, curriculum, techniques of teaching, and equipment evaluation.

163 **Basic Simulation—Driver Education** (3)

Orientation and psychological foundations of simulator instruction. Operation, care, and preventive maintenance; organization and administration of a driver education simulator program.

165 **Driver and Safety Education** (3)

Modern methods and materials in traffic safety and driver education; psychological testing; Drivucator; multiple car method.

202 **Conceptual Basis of Motor Learning** (3)

Theories of learning and application to development of motor skills.

250 **Administration of Urban Leisure Services** (3)

Planning and organization of a comprehensive system of urban leisure services utilizing educational, cultural, and recreational resources; emphasis on public relations, personnel administration and supervision, systems analysis, fiscal management and managerial accountability.

Physics

Chairman: Julian Eisenstein, Professor of Physics; Corcoran 102, Telephone 676-3275

STRONOMY

9–10 **Introduction to Astronomy** (3–3) (Campus Course)

Lecture (2 hours), recitation (1 hour), laboratory (2 hours). Classical through modern astronomy with introduction to basic principles underlying astronomical systems and observations. Primarily for nonscience majors. Laboratory fee, $11 a semester.

YSICS

1 **General Physics** (4) (Campus Course)

Topics in classical physics which form a foundation for modern physics. Prerequisite: two years of college preparatory mathematics or concurrent registration for Math 6. Laboratory fee, $11.

2 **Introduction to Modern Physics** (4) (Campus Course)

Selected topics in modern physics, including relativity and quantum theory. Prerequisite: Phys 1 or equivalent. Laboratory fee, $11.

*3 **General Physics** (3)

Same as Phys 1 without laboratory.

†4 **Introduction to Modern Physics** (3)

Same as Phys 2 without laboratory.

ysiology

irman: R.A. Kenney, Professor of Physiology; Ross Hall, Telephone 331-6551

115 **Physiology for Nurse Anesthetists** (3)

‡231 **Review of Oral Biology** (2)

itical Science

rman: H.L. LeBlanc, Professor of Political Science and Public Affairs; C–619, hone 676-6290

partmental prerequisite: P Sc 4 and 6 or 5 and 6 are prerequisite to courses litical Science numbered from 101 to 200. Courses numbered from 201 to 300 r graduate students who have the appropriate undergraduate course prerequi-

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course may not be taken by students who have completed, or are enrolled in, or plan to n Phys 1.

ourse may not be taken by students who have completed, or are enrolled in, or plan to n Phys 2.

only to students in the program of study leading to the degree of Master of Science in tudies with a concentration in Oral Biology.

4 **Introduction to Political Science** (3) (Campus Course)
Introduction to the study of comparative political systems; emphasis o contemporary concepts and techniques used to examine politics and gov ernment. Students who receive credit for P Sc 4 cannot receive credit fo P Sc 5.

5 **Introduction to Political Science** (3)
Introduction to the study of comparative political systems; emphasis o structures and processes of major foreign governments and the force o basic ideologies. Students who receive credit for P Sc 5 cannot receive credit for P Sc 4.

6 **Introduction to Political Science** (3)
Introduction to the study of the structure, powers, and processes of the American political system.

103 **State Politics** (3)
Theory and practice of American federalism, factors influencing state policy choices, state responsiveness to urban problems.

104 **Urban Politics** (3)
Demographic trends and implications, local metropolitan political systems, issues in urban politics, strategies of political change.

111 **Comparative Government and Politics** (3)
Government and politics of the principal constitutional democracies of Western Europe.

*112 **Comparative Government and Politics** (3)
Government and politics of the communist nations; emphasis on the Soviet Union and the countries of Eastern Europe.

117–18 **Political Theory: Major Issues of Western Political Thought** (3–3)
P Sc 117: foundations of Western political thought—Plato to Aquinas. P Sc 118: philosophical roots of modern political order and disorder— Machiavelli to Rousseau.

119–20 **American Political Thought** (3–3)
Introduction to political thought in the United States from colonial times to the present.

121–22 **U.S. Constitutional Law and Politics** (3–3)
P Sc 121: separation of powers, federal-state relationships, economic regulation. P Sc 122: political and civil rights. Prerequisite: junior status.

125 **Legislative Process** (3)
Study of Congress and the state legislatures, including legislative power structure, selection of legislators and the roles they play, decision-making, and the relationship between the legislative and executive branches.

126 **The American Presidency** (3)
Development of the institution, selection process, role of the Presidency in policy-making.

* P Sc 112, 115, and former 161 are related in their subject matter, and credit for only one of the three may be applied toward a degree.

145 **U.S. Political Parties and Politics** (3)

Party system and structure, role of ideology, voting behavior, campaigns and elections, devices for organizing the government.

151 **Public Administration and Public Policy-making** (3)

Examination of the process by which the federal government selects and implements public policies. Particular attention to the role of bureaucracies in the policy-making process. Criteria for the evaluation of public policy.

167 **U.S. Foreign Policy** (3)

Constitutional and political factors that determine the formulation, execution, and substance of U.S. foreign policy.

171 **International Politics** (3)

International actors, international and domestic environments of foreign policy, global and regional patterns, general characteristics of foreign policy.

172 **International Organizations** (3)

Development and operations of the United Nations, regional organizations, and functional international organizations.

181–82 **Public International Law and Organization** (3–3)

Survey of the public law of nations. P Sc 181: emphasis on the law of peace. P Sc 182: continuation of the law of peace; attention to neutrality and the so-called law of war.

190 **Politics of Middle and Southern Africa** (3)

Comparative analysis of the political systems of selected countries of non-Mediterranean Africa.

191 **Governments and Politics of the Middle East** (3)

Domestic and international politics of the eastern Arab states, Turkey, Iran, and Israel.

192 **Governments and Politics of North Africa** (3)

Domestic and international politics of Algeria, Tunisia, Morocco, Libya, Egypt, Sudan; their relations with states of the Middle East.

193 **Governments and Politics of South and Southeast Asia** (3)

Domestic and international politics of the major states in the area.

194 **Governments of China and Japan** (3)

Institutions and processes of government in contemporary China and Japan, with some historical background. Attention to ideological forces. Students who receive credit for P Sc 194 cannot receive credit for P Sc 162.

204 **Urban Politics** (3)

Readings and discussions on patterns and implications of urban growth, local and metropolitan political systems, policy formation and change, conflict management, political constraints on social reform.

205 **Government, Science, and Technology** (3)
Examination of the demands on national and international political systems resulting from the impact of scientific and technological developments and of the responses of governmental institutions and processes to these demands.

209 **Presidential-Congressional Relations** (3)
Examination of the patterns of interaction between the executive and legislative branches; emphasis on policy-making roles and structures.

211–12 **Comparative Government and Politics** (3–3)
Problems of comparative political analysis; a comprehensive examination of the literature in comparative politics.

215–16 **Seminar: the Communist Camp in World Politics** (3–3)
Significant issues of communism, particularly in the Soviet Union and Red China; concept and structure of "world socialist system"; intra-Bloc relations with emphasis on the Sino-Soviet dispute.

220 **Congress and the Political System** (3)
Examination of the roles, structure, and function of political parties and interest groups as they relate to the legislative process.

222 **Judicial Policy-making and Civil Liberties** (3)
Examination of the role of the judiciary in policy formulation; emphasis on the U.S. Supreme Court and civil liberties issues.

223 **Defense Policy Analysis** (3)
Analysis of selected topics in U.S. defense policy.

239 **Economic Policy Analysis I** (3)
Analysis of selected topics in U.S. monetary and fiscal policy.

240 **Legislative Theory and Behavior I** (3)
Selected problems of the U.S. legislative system at the national and state level. Emphasis on legislative recruitment, representative-constituency relations, policy-making and communication.

241 **Legislative Theory and Behavior II** (3)
Selected problems of legislative theory and behavior from a comparative perspective with particular reference to the parliamentary systems of West Germany, France, and Britain.

242 **Methods of Legislative Research** (3)
(Formerly Legislative Affairs)
The process of empirical research: construction of research design, data collection, and analysis. Techniques discussed will include content analysis, survey research, and analysis of institutional voting.

244 **Public Policy Analysis** (3)
Reading and research in systematic methods of public policy analysis.

247 **Economic Policy Analysis II** (3)
Analysis of selected topics in U.S. monetary policy.

259 **Foreign Policy Analysis—Selected Topics** (3)

Analysis of U.S. foreign policy toward selected world regions.

267 **Seminar: U.S. Foreign Policy** (3)

Research and selected reading as the basis for an analysis of the foreign policy of the United States, with particular reference to the decision-making process and the execution of policy.

288 **Seminar: Soviet Military Policy and Strategy** (3)

Soviet developments in military policy and strategy with attention to intra-Bloc military cooperation, political context of Soviet military policy, significant changes in recent Soviet military thought.

sychology

hairman: R.D. Walk, Professor of Psychology; GG-211, Telephone 676-6320

Departmental prerequisite: Psyc 1 or 5 or 6 is prerequisite to all other courses Psychology. Six semester hours in Psychology courses are prerequisite to Psyology courses numbered above 100. The departmental prerequisite may be waived th the permission of the instructor.

1 **General Psychology** (3)

Fundamental principles underlying human behavior.

8 **Psychology of Motivation and Personality** (3)

Introduction to the psychology of personality. Principles of motivation, personality development, social and cultural factors, and assessment and description of personality emphasized.

22 **Introduction to Educational Psychology** (3)

The contributions of psychology to education; emphasis on learning.

29 **Psychology of Childhood** (3)

Developmental approach to study of the child. Emphasis on the socialization process, learning, and the child's view of the world.

101 **Abnormal Psychology** (3)

Causes, diagnosis, treatment, and prevention of various types of maladjustments and mental disorders. Prerequisite: 6 semester hours in psychology, or 3 in psychology and 6 in a biological science.

112 **Psychology of Adolescence** (3)

Psychological characteristics and problems peculiar to adolescence, with emphasis on applications of psychology to solution of such problems.

121 **Psychology of Learning** (3)

Theories and issues related to basic learning processes as determinants of behavior. Emphasis on current research using both human and animal subjects.

129 **Theories of Personality** (3)

Survey of personality theories; emphasis on their application to problems of individuals.

131 **Psychological Tests** (3)

Survey of psychological tests and their more common uses in business, industry, government, law, medicine, and education. Material fee, $7.

144 **Personnel and Industrial Psychology** (3)

Psychological concepts and methods applied to problems of personnel management, human engineering, employee motivation, and productivity.

145 **Psychology of Management** (3)

Psychological aspects of managing work organizations. Departmental prerequisite waived.

146 **Psychotechnology of Learning and Training** (3)

Psychological principles, concepts, and techniques of human learning and behavioral modification as applied to the design and operation of training and development systems.

151 **Social Psychology** (3)

Social foundations of attitudes and behavior: cognition, motivation, role-behavior, communication, small-group processes, racial attitudes, nationalism, and war.

156 **Psychology of Attitudes and Public Opinion** (3)

Psychology of opinion formation, measurement of opinion, social determinants of attitudes, psychological processes in propaganda, bases of receptivity to propaganda, psychological warfare.

175 **Career Development in Youth and Maturity** (3)

Emphasis on the development of long-range career objectives based on review of experiences, the results of psychological testing, seminar discussion groups, and guided independent study. Analysis and practice of the specific skills needed to negotiate for advancement or to accomplish a career change. Credit for this course may not be applied toward a Bachelor's degree with a concentration in Psychology.

211 **Assessment of Cognitive Functioning** (3)

Concepts of intelligence and achievement and their assessment through a variety of group and individual procedures. Emphasis on evaluation of children. Material fee, $7. Admission by permission of instructor.

246 **Seminar: Personnel Measurement Techniques** (3)

Detailed consideration of techniques of personnel selection and performance evaluation. Employment tests, personal data, assessment interviews, and performance ratings.

ublic Administration

hairman: D.S. Brown, Professor of Management; Government 302, Telephone 6-6295

213 **Administration in Government** (3)

Critical analysis of federal administrative organizations as an integral part of the political system. Roles of Congress, the President, the courts, interest groups, political parties, and the public in the administrative process; special attention to centripetal and centrifugal forces.

215 **Comparative Administrative Systems** (3)

Examination and analysis of the administrative systems of selected foreign governments; attention to practices applicable to administration in the United States.

218 **Seminar: Developmental Administration II** (3)

Problem of the transfer of administrative capability from one country to another. Political and administrative development. Unilateral and multilateral approaches. The role of the innovator. Strategies of administrative development.

220 **Law, Responsibility, and the Public Administrator** (3)

Exploration and analysis of the legal and moral forces and factors which guide the administrator/manager in his decision-making. The role of the law, the courts, and the agency counsel. Understanding the several meanings of responsibility, including accountability.

221 **Management in the Executive Branch** (3)

Analysis of application of management theory and practice in the executive branch of the federal government; emphasis on staff responsibilities and relationships and internal organization and control.

223 **Behavioral Factors in Large Organizations** (3)

Analysis of the nature and characteristics of bureaucracy; dysfunctionalism; approaches to policy guidance and leadership, particularly in large public organizations; influence and control systems.

231 **Public Personnel Administration** (3)

Survey of basic principles and functions of personnel administration in the public service. Roles of personnel management, recruitment, placement, wage and salary administration, training, retirement, and other personnel functions.

232 **Problems in Public Personnel Management** (3)

Analysis and evaluation of major personnel management problems in government; employee-management relations; interagency and intergovernmental relationships. Impact of automation. Evaluation of personnel systems.

233 **Seminar: Manpower Development and Utilization** (3)

Examination of public and private manpower policies and programs, including their rationale and effectiveness. Students will select a specific program area for individual exploration.

235 **Technological Change and Manpower** (3)

Research, discussion, and readings dealing with manpower problems arising from automation and other technological changes. Evaluation of these developments in government and business; their implications for productivity, employment, training and education, and personnel and industrial relations. Analysis of economic, political, and social factors influencing public and private manpower policies.

245 **Managing the Changing Federalism** (3)

An analysis of organic changes in the administration and management of intergovernmental programs in a rapidly changing American federalism. Federal, state, regional, and locally-shared systems studied from theoretical and practical vantages.

246 **Urban Dynamics and Citizen Participation in Administration** (3)

Exploration of the nature, costs, and benefits of citizen participation in administration of metropolitan area programs. Focus on tools of citizen participation, their impact on federal policy and reorganization of urban government, and the effect of decentralization on citizen participation.

248 **Financing Metropolitan Services** (3)

Analysis of the structure and administration of public finance of local governments.

249 **Administration in Metropolitan Area Governments I** (3)

An ecological approach to understanding and managing urban processes and trends; exploration of economic, social, and political factors that affect metropolitan administration.

250 **Administration in Metropolitan Area Governments II** (3)

Examination of metropolitan governmental structures and functions, public and private demands on the system, decision-making in the urban complex, feedback and evaluation.

251 **Governmental Budgeting** (3)

Survey of the basic concepts, principles, and practices in governmental budgeting; interrelationship of planning, programming, and budgeting; their role in the management process.

252 **Problems in Planning, Programming, and Budgeting** (3)

Intensive analysis of developments in federal planning, programming, and budgeting; application of new tools in the decision-making process; evaluation of the systems.

254 **Seminar: Financial Management in the Federal Service** (3)

Functions and interrelationships of central federal financial management agencies, their policy, economic and managerial roles, controllership functions, and standards and practices in financial management.

260 **Policy Formulation and Administration** (3)

Analysis in depth of factors and processes involved in policy development, with particular attention to selected areas of national policy; development of agency goals and objectives.

262 **Seminar: Science, Technology, and Public Policy** (3)

The impact of science and technology upon public administration in terms of both administrative practice and national policies.

299 **Thesis Seminar** (3) (Campus Course)

Examination of research methodology in Public Administration.

300 **Thesis Research** (3)

Religion

Chairman: R.G. Jones, Professor of Religion; O-11, Telephone 676-6325

9 **The Old Testament** (3)

Historical and literary study of the Old Testament with consideration of development of religious ideas, institutions, and outstanding personalities.

10 **The New Testament** (3)

Study of New Testament literature from the standpoint of occasion, purpose, dominant ideas, and permanent values. Emphasis on approach, structure, and significance of the Gospels and Epistles.

21 **Introduction to Religious Thought** (3)

Traditional religious concepts, language of contemporary religion amidst modern scientific and secular intellectual tendencies, and the place of religion in today's society.

59–60 **History of Religions** (3–3)

Origins, evolution, and contemporary status in historical context. Rel 59: primitive religion and the religions of the East (Hinduism, Buddhism, Taoism, Confucianism, Shinto). Rel 60: religions of the West and Near East (ancient religions, Judaism, Christianity, Islam).

127 **Medicine, Religion, and Healing** (1) (Campus Course)

Total care concept. Importance of religion in medical practice for patient and physician. Concept of the professional man, the clergy's role in healing, religious perspective on issues in medical ethics.

216 **Supervised Clinical Pastoral Education** (I-A) (6)

Full-time program of clinical pastoral education in an approved center. Involvement in the responsibility for pastoral ministry is reviewed and evaluated in a peer-group context.

217 **Supervised Clinical Pastoral Education** (I-B) (6)

A continuation of Rel 216 with emphasis on pastoral and personal identity, sustained pastoral relationships, and pastoral methods and skills.

218 **Supervised Clinical Pastoral Education** (III-A) (6)

Responsibility in pastoral ministry is increased with emphasis on group work, interprofessional involvement, use of specific counseling methods, work with persons with special problems. Prerequisite: Rel 216 and 217; or equivalent.

219 **Supervised Clinical Pastoral Education** (III-B) (6)
Continuation of Rel 218 with emphasis on examination and review of administrative procedures, design of pastoral programs, and development of a pastoral theology.

222 **Seminar: Christian Ethics** (3) (Campus Course)
Important tendencies in ethical reflection of the contemporary Christian Church; contributions of social sciences to that reflection.

223 **Religious and Ethical Perspectives on Medical Problems** (3)
Religious and ethical questions in medical problems and medically related issues.

225 **The Dynamics of Ministering to the Young Adult** (3)
Conceptual models of development of young adults from late adolescence; special problems of educational and military experience, vocational choice, marriage and the family, and physical, intellectual, emotional, and religious development. Encounter experience with persons and groups.

227–28 **Advanced Studies in Pastoral Care** (3–3)
History and present state of methodologies and conceptual models of pastoral counseling and leadership in groups; supervised work in interfaith and multidisciplinary ministries.

235 **Seminar: Roman Catholicism in the Modern World** (3) (Campus Course)
Important leaders and their ideas in selected developments since 1500—doctrinal, spiritual, biblical, liturgical, and ecumenical.

237 **Seminar: Theological Analysis** (3) (Campus Course)
Historical and topical study of the development of important ideas in such areas as Christology, soteriology, and ecclesiology.

299–300 **Thesis Research** (3–3) (Campus Course)

Slavic Languages and Literatures

Chairman: C.A. Moser, Associate Professor of Russian; Library 627, Telephone 676-6335

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year Russian** (3–3) (Campus Course)
Beginners' course in fundamentals of grammar and pronunciation. Prerequisite to Slav 2: Slav 1. Laboratory fee, $17.50 a semester.

3–4 **Second-year Russian** (3–3) (Campus Course)
Intermediate course in Russian language. Prerequisite to Slav 3: Slav 1–2 or two years of high school Russian. Prerequisite to Slav 4: Slav 3. Laboratory fee, $17.50 a semester.

9–10 **Intermediate Russian Conversation and Composition** (3–3) (Campus Course)

Listening comprehension; oral and written practice. Prerequisite: Slav 4 or 6, or permission of instructor.

91–92 **Introduction to Russian Literature** (3–3)

Emergence and development of Russian literature and ideas from earliest times to the early 20th century—in English.

109–10 **Advanced Russian Conversation and Composition** (3–3)

Developing proficiency in oral and written expression. Prerequisite: Slav 10 or equivalent.

161–62 **Russian Culture** (3–3)

Survey of Russian cultural heritage from origins of ancient Russia to present—in English. Lecture, recitation, discussion, and individual reports on assigned topics.

165 **Soviet Literature from the Revolution to World War II** (3)

Basic themes, issues, literary figures of the Soviet 1920's. The fate of literature and writers under increasing state control; Five-year Plan literature. Lecture, discussion, reports—in English.

166 **Soviet Literature from World War II to the Present** (3)

Literature in wartime, under Stalinism, and in the "thaws." The new generation of dissident liberals and "underground" literature. Lecture, discussion, reports—in English.

193–94 **The Other Slavs: Their Literature—in English** (3–3)

An examination of non-Russian Slavic literatures from their beginnings to the present day. Emphasis on themes, ideas, and styles peculiar to each literature.

ociology

hairman: R.G. Brown, Professor of Sociology; D-201, Telephone 676-6345

Departmental prerequisite: Soc 1 is prerequisite to all other courses in Sociology.

1 **Introductory Sociology** (3)

General principles of sociology; development of culture and personality, impact of groups and institutions on man's social behavior. Survey of fields within sociology.

2 **American Social Problems** (3)

Analysis of major social problems confronting the United States; factors producing social problems, their nature and treatment.

61 **Development of Social Thought** (3)

Examination of concepts and theories relevant to the nature of society and human relationships from ancient writings to the 20th century. Prerequisite: Soc 1.

124 **Medical Sociology** (3)

Social factors and processes related to the etiology and treatment of physical and mental illness; medical occupations and professions, medical organizations, problems of delivery of health care services.

126 **Urban Sociology** (3)

Place of the city in larger society; growth of the city, problems of urban living, group life, personality, urban housing, city planning, and suburban development.

127 **Population Problems** (3)

Composition of populations, trends in population growth and population pressure, factors producing population movements, effects of migration, population policies—eugenics and birth control.

129 **Race and Minority Groups** (3)

Analysis of relationships between dominant and minority groups in society, particularly in the United States; nature and range of problems; analysis of the phenomenon of prejudice.

130 **Class, Status, and Power** (3)

(Formerly Social Stratification)

Analysis of distribution of resources and opportunities for participation, education, and social mobility in American society; international comparison; analysis of public policies which affect these distributions.

131 **Law and Morality** (3)

Law is highly organized control of human behavior through rules. As such it is in constant connection with moral principles. This course is designed to explore the connections between law and morality; particularly on issues such as the justification for maintaining prohibitions against morals offenses, the proper aims of criminal justice, and the legal and moral support for civil disobedience.

134 **Marriage and the Family** (3)

Courtship as a social process, marriage and marital adjustment, development of the family, parent-child relations, family problems, disorganization, divorce, and family reorganization.

135 **Juvenile Delinquency** (3)

Factors producing delinquency, juvenile detention, the juvenile court, training schools, treatment of offenders.

136 **Criminology** (3)

Nature and distribution of crime as related to the development and operation of criminal law and various social and legal institutions in urban society.

141 **Social Research Methods** (3)

Introduction to scientific method in the development of social theory and the solution to social problems. Prerequisite: Stat 53 or 104.

149 **Modern Sociological Theory** (3)

Systematic study of contemporary schools of sociological theory, both European and American development; evaluation of scientific contributions of each school. Prerequisite: Soc 61.

201 **Concepts of Sociology** (3)

Systematic survey, critical analysis of sociological concepts. Emphasis on theoretical systems.

210 **Theoretical Foundations of Political Sociology** (3)

Sociological theory on the relationship of politics to the wider social system. Emphasis on concepts of power, alienation, ideology, political stability, conflict, and change.

211 **Seminar: Social Change** (3)

Comparative study of political processes concentrating on political development in Third World Nations.

227–28 **Seminar: Urban Social Problems** (3–3)

Multidisciplinary seminar which examines the value context, strategies, and programs currently applied to the solution of major urban problems with emphasis on the various perspectives and approaches developed through the social sciences, principally sociology. Soc 227: discussion and analysis of the development of social science approaches in contrast to other approaches. Soc 228: discussion and analysis of the current problems of interest and concern to students in the seminar. It is recommended that Soc 227 be taken before Soc 228.

248 **Seminar: Organizational Theory and Behavior** (3)

Advanced analysis of theory and behavior in complex organizations relative to defining organizations, examining basic social processes and their relationship to the cultural environment.

270 **Educational Sociology** (3)

Analysis of educational systems from institutional perspectives and as agencies of socialization; relationships of education in general to society, including technological, communal, and subcultural components.

271 **Sociology of the Youthful Offender** (3)

Factors producing delinquency, juvenile detention, the juvenile court, training schools, treatment of offenders.

272 **Social Disorganization** (3)

Analysis of factors contributing to disruption of social groups, institutions, and communities; study of attempts to establish social controls to prevent, minimize, or mitigate the effects of socially disruptive conditions and events.

273 **Deviant Behavior** (3)

Analysis of relationships of society, socialization, and deviancy. Social responses to deviancy and criminal offenders; rehabilitative programs in community, courts, and schools.

Spanish*

Chairman: J.F. Burks, Professor of French; A-11, Telephone 676-6330

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year Spanish** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Span 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern Spanish prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester.

3–4 **Second-year Spanish** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Span 4. Conversation, grammar, composition, reading of modern Spanish prose, introduction to Hispanic civilization. Aural training, oral practice in language laboratory. Prerequisite: Span 1–2, or two years of high school Spanish. Laboratory fee, $17.50 a semester.

Special Education

Chairman: Perry Botwin, Professor of Special Education; C-429, Telephone 676-6170

170 **Interpersonal/Intrapersonal Relationships for Teachers** (3)

Consideration of factors leading to successful interaction with children.

200 **Understanding Young Exceptional Children** (3)

Lecture and field experience. Basic concepts of early child development as applied to special education.

201 **Introduction to Special Education** (3)

Survey course to acquaint prospective teachers with special education and to help them become aware of the various educational modifications necessary to accommodate children in a school program.

222 **Special Education in the Regular Classroom** (3)

Special techniques and materials for regular classroom teachers to assist children who have learning and/or behavior problems; emphasis on specific, practical strategies and applications. Open to undergraduate seniors.

240 **Educational Programming for Children with Behavioral Problems** (3)

Analysis of educational provisions for children with behavioral problems through study of ecological considerations in the light of contemporary special education theory.

241 **Preprofessional Internship: Crisis/Resource Teaching** (6)

(Formerly Preprofessional Internship: Children with Behavioral Problems)

Practicum experience early in the training sequence, consisting of observation of, and interaction with, children with behavioral problems. Under

* Administered by the Department of Romance Languages and Literatures.

the direction of qualified teachers in a field setting. A minimum of 280 clock hours required.

242 **Clinical Teaching of Children with Behavioral Problems** (3)
Lectures and discussions exploring various psychoeducational techniques of teaching children and adolescents with behavioral problems.

250 **Specialized Techniques and Materials for Diagnostic-Prescriptive Teachers** (3)
Selected materials and techniques used in diagnostic-prescriptive teaching. Must be taken concurrently with S Ed 252. Admission by permission of instructor.

251 **Psychosocial Factors in Diagnostic-Prescriptive Teaching** (3)
Psychosocial factors significant in the process of diagnostic-prescriptive teaching. Admission by permission of instructor.

252 **Professional Internship for Diagnostic-Prescriptive Teachers** (6)
Supervised school experience in diagnostic-prescriptive teaching. Must be taken concurrently with S Ed 250. Admission by permission of instructor. A minimum of 280 clock hours required.

253 **The Humanizing Curriculum in Diagnostic-Prescriptive Teaching** (3)
Curriculum concepts and modifications aimed at enhancing the classroom environment for learning and growth. Admission by permission of instructor.

260 **Identification and Assessment of the Educational Needs of Young Children** (3)
(Formerly Diagnosis of the Educational Needs of Young Children)
Observation-demonstration course designed in preparation for informal evaluation techniques. Admission by permission of instructor.

261 **Methods for Teaching Young Impaired Children** (3)
(Formerly Special Methods for Teaching Young Children)
Lecture, workshop, demonstrations. Specialized techniques, curricula, and materials used with young children. Students develop and experiment with new methods and materials. Admission by permission of instructor. Limited to 20 students.

262 **Seminar: the Education of Young Exceptional Children** (3)
Weekly seminar dealing with concepts and topics pertinent to the education of young exceptional children. Admission by permission of instructor.

263 **Introduction to the Education of the Severely and Multiply Handicapped** (3)
Survey of the characteristics and learning patterns of children with severe disabilities. Lecture and field experience.

264 **Advanced Study in the Special Education of the Severely and Multiply Handicapped** (3)
Specialized programs, techniques, and methods for teaching children with severe disabilities.

267 **The Role of the Early Childhood Special Educator** (3)
Examination of the spectrum of roles available in early childhood special

education; emphasis on role expectations and psychosocial dynamics the various settings.

268 **Pre-school Planning for Children with Disabilities** (3)
Lecture and field experiences. Application of learning patterns to the ed cation of children with disabilities.

270 **Adapting the Early Childhood Curriculum to Meet Special Needs** (3)
Review of the basic curriculum areas as they relate to the development readiness skills in special education.

291 **Practicum in Crisis/Resource Teaching** (6 or 9)
(Formerly Practicum in Teaching Children with Behavioral Problems)
Supervised student teaching in programs for children with behavioral pro lems. Under the direction of a qualified teacher and the supervision of t University staff. Minimum of 360 or 420 clock hours required.

292 **Practicum in Teaching Young Children in Special Education** (6)
Supervised student teaching in special education in classrooms for your children. Minimum of 350 clock hours required.

294 **Practicum in Diagnostic-Prescriptive Teaching** (6 or 9)
Supervised field experience in diagnostic-prescriptive teacher program Minimum of 360 or 420 clock hours required. Admission by permissio of instructor.

303 **Administration and Supervision of Special Education** (3)
Philosophy and nature of special education; program organization, ad ministration, and development. Surveying local-level needs; program evaluation and supervision. Admission by permission of instructor.

304 **Recent Research and Trends in Special Education** (3)
Emphasis on research methodology and considerations. The unique prob lems of doing research in special education. Procedures and sources fo obtaining research funding. Admission by permission of instructor.

306 **Counseling Families of Children with Special Needs** (3)
Working with parents and community agencies in meeting the educational and social needs of young children. Admission by permission of instruc tor.

342 **Seminar: Crisis/Resource Teaching** (3)
Topics and concepts relevant to an exploration of alternative models in the education of children perceived as having learning/behavior problems. Admission by permission of instructor.

343 **Psychoeducational Diagnosis of Children** (3)
Lecture and laboratory course designed to develop *educational* strategies for children who present behavior or learning problems in the schools. Admission by permission of instructor.

350 **The Diagnostic-Prescriptive Teacher** (3)
Rationale, operational models, techniques, and problems relevant to im plementation of diagnostic-prescriptive teacher programs. Admission by permission of instructor.

351 **Seminar for Diagnostic-Prescriptive Teachers** (3)

Current practices in regular and special education as they affect the diagnostic-prescriptive teacher; emphasis on concurrent field experience. Admission by permission of instructor.

352 **Seminar: Special Education Consultant Programs in the Schools** (3)

For school-based consultants in special education; focuses on in-school program development and recent trends in processes and procedures. Admission by permission of instructor.

370 **Intrapersonal Dynamics in Special Education** (3)

Small group exploration of intrapersonal factors essential to understanding roles and interpersonal techniques in teaching exceptional children. Admission by permission of instructor.

peech and Drama

hairman: G.F. Henigan, Professor of Speech; Auditorium 6, Telephone 676-6350

1 **Communicative Speaking and Listening** (3)

Basic theories and principles of speech communication; composition, delivery, and criticisms of speaking in interpersonal, group, and public situations. Recording fee, $2.

11 **Voice and Diction** (3)

Development of naturalness, correctness, and clarity in conversational speech. Analysis and correction of individual speech delivery faults through tapes and weekly performances. Recording fee, $4.

32 **Oral Interpretation of Literature** (3)

Theory and practice in discovering and communicating orally the meaning in literature through analysis of form and content. Techniques of reading prose, poetry, and drama for listeners. Prerequisite: Sp&D 11. Recording fee, $2.

45 **Understanding the Theatre** (3)

The art of the theatre; its literature, aesthetics, and mechanics. Contributions of the playwright, actor, director, and designer examined through lectures, visiting artists, class discussions, and attendance at theatrical performances. Primarily for nonmajors.

91 **Parliamentary Procedure and Group Participation** (3)

Principles and procedures for effective speech communication to function successfully at various levels of responsibility in academic, social, professional, civic, or business organizations. Prerequisite: Sp&D 1 or 11, or permission of instructor.

*111 **Business and Professional Speaking** (3)

Study of the communication process in business and professional speaking; practice in presenting technical reports; selling policies, programs, and services; interviews; conferences; speech in training and supervisory activities. Primarily for nonmajors.

*No course can be adapted to the needs of a specific group.

121 **Group Discussion and Conference Leadership** (3)

Process of thinking and problem-solving in committees and small groups; methods of leading discussions and conferences. Prerequisite: Sp&D 1 or permission of instructor.

270 **Hearing and Language in Children: Evaluation and Planning** (3)

Hearing, language, and speech diagnostic procedures; primary emphasis on interpretation of test findings leading to therapy/educational planning.

271 **Hearing and Language in Children: Demonstration and Participation** (3)

Demonstration and student participation in case review; interpretation of hearing, language, and speech diagnostic findings, planning of therapy/educational programs.

Statistics

Chairman: Herbert Solomon, Professor of Statistics; C-311, Telephone 676-6356

Departmental prerequisite: One entrance unit in algebra is prerequisite to courses in Statistics numbered below 100.

*51 **Introduction to Business and Economic Statistics** (3) (Campus Course)

Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, time series, index numbers. Laboratory fee, $18.

53 **Introduction to Statistics in Social Science** (3) (Campus Course)
(Formerly Introduction to Statistics in Psychology and Education)

Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests by hypotheses, correlation, analysis of variance. Laboratory fee, $18.

101–2 **Basic Principles of Statistical Methods** (3–3)

Variables and attributes, averages and dispersion, elementary principles of sampling, introduction to the making of statistical decisions.

107 **Statistics for Engineers** (3)

Probability models, discrete and continuous distributions, sampling, hypothesis testing and estimation, engineering applications. Prerequisite: differential and integral calculus.

109–10 **Quality Control and Reliability Techniques** (3–3)

Statistical methods and probability models for quality control and reliability applications. Prerequisite: Stat 91 or 107.

111 **Business and Economic Statistics I** (3)

Statistical processes as tools in decision-making in areas of economics and business. Admission by permission of instructor.

*Stat 101–2, *Basic Principles of Statistical Methods* (3–3), which is offered off campus, may be substituted.

112 **Business and Economic Statistics II** (3)
Case work to illustrate quantitative procedures for solution of economic and business problems. Prerequisite: Stat 111 or equivalent.

Telecommunication Operations

Faculty Adviser: D.A. Rowley, Associate Professor of Chemistry; Bacon 201, Telephone 676-6210

250 **Survey of Telecommunications Systems** (3)
Survey of existing national and world-wide telecommunications systems.

251 **Telecommunications Systems Concepts** (3)
Introduction to analysis and design of telecommunications systems.

APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subject to change in connection with the establishment of judicial processes. Bulletins and handbooks incorporating any changes will be issued as appropriate.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on October 19, 1968:

Whereas, safety and order are essential preconditions of the learning process, and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection of free speech and freedom of assembly, and to safeguarding the right of lawful protest on campus; and is committed equally to maintaining the peace and safety of the campus, in the knowledge that all rights are in jeopardy when violence and civil disorder prevail over law and reason;

Now, therefore, be it resolved by the Senate of The George Washington University: that in the event a demonstration at this University exceeds the bounds of free assembly and lawful advocacy, and demonstrators are engaging in unlawful acts which cause or imminently threaten injury to persons or property, or which obstruct or interfere with normal and necessary University activities, this body affirms the authority of the President, or other University officials designated to act in his absence, to take such reasonable steps, if possible after consultation with the Chairman of the Executive Committee of the University Senate* and the President of the Student Body, as are required to restore and preserve order; including, if deemed necessary and appropriate, suspension of students or faculty engaging in such acts, and use of such law enforcement personnel as are needed to effect the removal, arrest, and prosecution of law violators. Any such suspension shall be reviewed by an appropriate tribunal as soon after order is restored as is practicably possible.

The following was approved by the University's Board of Trustees on October 19, 1968:

Any student suspended from The George Washington University on the grounds of exceeding the bounds of free assembly and lawful advocacy shall have his suspension reviewed by the Hearing Committee on Student Affairs† of The George Washington University as soon after order is restored as is practicably possible.

* The University Senate has been renamed the Faculty Senate.

† The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 9, 1968*:

The George Washington University is opposed to discrimination based on race, color, creed, sex, or national origin. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 9, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

(1) who engages in conduct that unreasonably obstructs teaching, research, or learning, or

*Amended January 18, 1973.

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

(c) who disobeys general regulations of the University, or

(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established within the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*

* The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

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GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master of Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.), Master of Music (Mus.M.), Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers), Master of Science in Forensic Science (M.S. in Forens.S.), Master of Science in Special Studies (M.S. in Sp.Std.), and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE AND HEALTH SCIENCES: Associate in Science (A.S.), Bachelor of Science in Allied Health Science (B.S. in A.H.S.), and Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master of Comparative Law (M.Comp.L.), Master of Comparative Law (American Practice) (M.Comp.L.(Am.Prac.)), and Doctor of Juridical Science (S.J.D.)

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SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed), Bachelor of Science in Physical Education (B.S. in P.E.), Master of Arts in Education (M.A. in Ed.), Master of Arts in Teaching (M.A.T.), Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Business Administration (B.B.A.), Bachelor of Science in Administration (B.S. in Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.), Master of Arts in Government (M.A. in Govt.), Master of Arts in Health Care Administration (M.A. in H.C.A.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), Master of Science in Administration (M.S. in Adm.), Master of Urban and Regional Planning (M.U.R.P. and Reg.Plan.), Post-Master's Graduate Certificate in Health Care Administration (Grad.Cert. in H.C.A.), Doctor of Business Administration (D.B.A.), and Doctor of Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.), Master of Arts (M.A.), and Master of Science in International Affairs (M.S. in I.A.)

THE GEORGE WASHINGTON UNIVERSITY

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THE GRADUATE SCHOOL OF ARTS AND SCIENCES, 1893

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES, 1825

THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, 1928

THE DIVISION OF UNIVERSITY STUDENTS, 1930

THE COLLEGE OF GENERAL STUDIES, 1950

THE SUMMER SESSIONS, 1916

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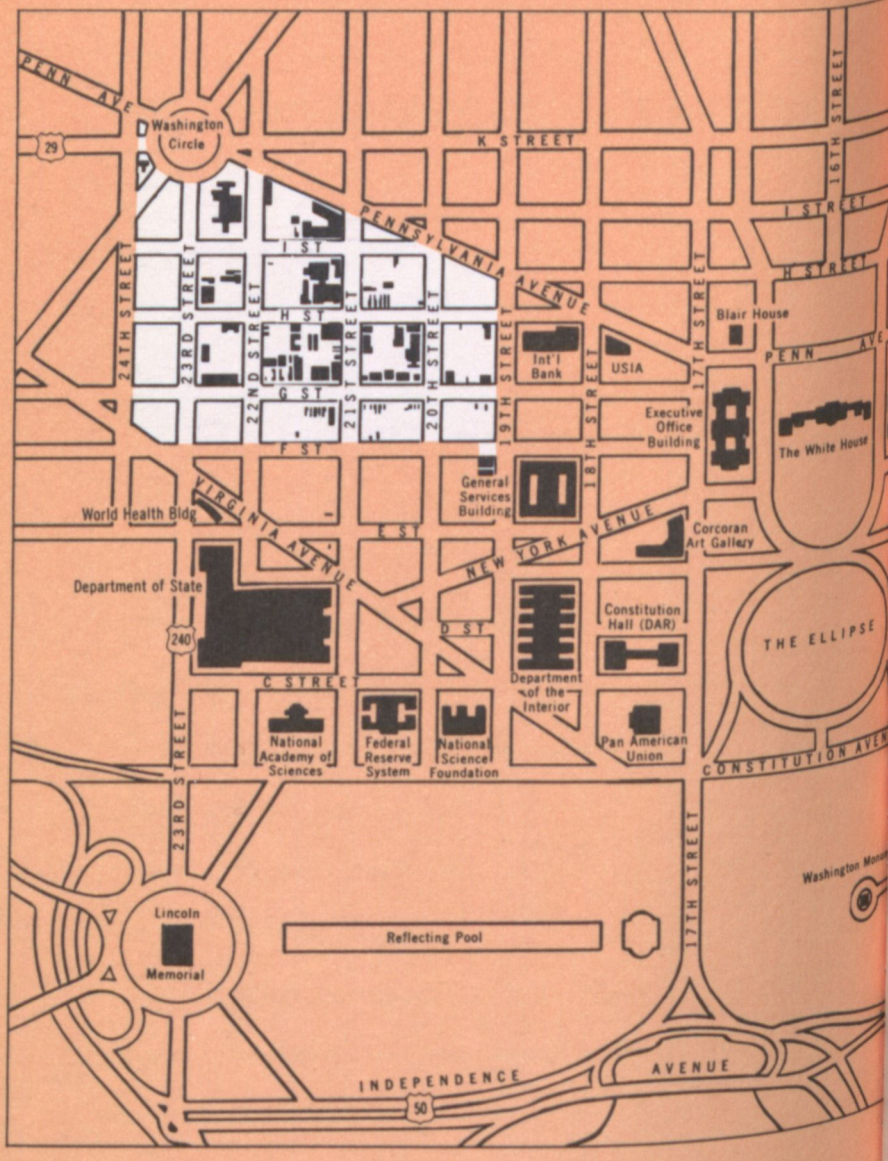

THE GEORGE WASHINGTON UNIVERSITY CAMPUS / WASHINGTON, D.C.

THE GEORGE WASHINGTON UNIVERSITY BULLETIN
Volume LXXII, Number 3, January, 1973

Published by The University at Washington, D. C. 20006

MONTHLY: JANUARY, MAY, JUNE, JULY
(2 ISSUES IN DECEMBER, FEBRUARY, AND APRIL)

Second Class Postage Paid at Washington, D. C.

THE GEORGE WASHINGTON UNIVERSITY BULLETIN

THE SUMMER SESSIONS 1973

WASHINGTON, D.C. 20006

FACTS ABOUT GEORGE WASHINGTON UNIVERSI

General Information	Private, nonsectarian, coeducational, founded 1821
Location	Washington, D.C., bounded by Pennsylvania Avenue and 19th, F, and 24th Streets, N.W.
Number of Students 1972 Summer Sessions	5,384 (3,415 men, 1,969 women)
Geographical Origin of Students 1972 Summer Sessions	50 states, District of Columbia, Canal Zone, Puerto Rico, Virgin Islands, 81 foreign countries
Number of Full-time Faculty 1972 Summer Sessions	238
Number of Part-time Faculty 1972 Summer Sessions	100
Students from Other Institutions Enrolled in the 1972 Summer Sessions	199 students from 146 institutions
Residence Hall Rates 1973 Summer Sessions	Multiple occupancy, $150 a five-week session; single occupancy, $200 a five-week session (see page 22)

Undergraduate majors: Accounting, American Civilization, American Literature, Anthropology, Applied Mathematics, Applied Statistics, Art History, Biology, Botany, Business Administration, Chemistry, Chinese Language and Literature, Chinese Studies, Civil Engineering, Classical Archeology and Anthropology, Classical Archeology and Classics, Classical Humanities, Dramatic Art, Economics, Electrical Engineering, Elementary Education, English Literature, Fine Arts, French Language and Literature, Geography, Geology, Germanic Languages and Literatures, History, International Affairs, Journalism, Latin, Latin American Studies, Mathematical Statistics, Mathematics, Mechanical Engineering, Medical Technology, Music (Applied, History and Literature, Theory), Philosophy, Physical Education, Physics, Political Science, Premedicine, Psychology, Public Affairs, Religion, Russian Language and Literature, Russian Literature and Culture—in Translation, Secondary Education, Sociology, Spanish American Literature, Spanish Language and Literature, Speech Communication, Speech Pathology and Audiology, Urban Affairs, Zoology.
Study leading to graduate or professional degrees is offered in the Graduate School of Arts and Sciences, the National Law Center, the School of Medicine, the School of Engineering and Applied Science, the School of Education, the School of Government and Business Administration, and the School of Public and International Affairs.

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ppendix: Recently Established Regulations
dex

A SUMMER SEMESTER IN THE NATION'S CAPITAL

THE GEORGE WASHINGTON UNIVERSITY offers a two-term summer program which makes it possible for students to earn 14 semester hours of credit during the summer months. The Library, classrooms, and residence hall are air-conditioned. For term dates, see the calendar on pages 5 and 6.

ALENDAR FOR THE 1973 SUMMER SESSIONS*

lication for Graduation—An "Application for Graduation" form *must* be and the appropriate fee paid at the time of registration for the summer ion of the senior or final year. Students completing degree requirements ng the Summer Sessions will be awarded diplomas (no formal convocation) ember 30, 1973, provided they have completed all degree requirements and e applied for graduation as a part of registration for the Summer Sessions.

COLUMBIAN COLLEGE OF ARTS AND SCIENCES

GRADUATE SCHOOL OF ARTS AND SCIENCES

SCHOOL OF ENGINEERING AND APPLIED SCIENCE

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS

DIVISION OF UNIVERSITY STUDENTS

First Session

June 11	Registration for first 5-week session and 7-week courses (10 am–7 pm) *Monday*
June 12	First 5-week session classes and 7-week courses begin *Tuesday*
June 27	D.B.A., D.P.A., and Ph.D. dissertations completed in the summer due in appropriate Dean's Office *Wednesday*
July 4	Holiday *Wednesday*
July 17	First 5-week session classes end *Tuesday*
July 18	First 5-week session examination day *Wednesday*
July 30	Seven-week courses end *Monday*
August 22	Master's theses completed in summer due in appropriate Dean's Office *Wednesday*

ormation concerning registration and scheduling of classes in Law, contact the Office of the National Law Center.

Second Session

July 19 Registration for second 5-week session (10 am–6 pm *Thursday*
July 20 Second 5-week session classes begin *Friday*
August 3 Eight-week courses end *Friday*
August 22 Master's theses completed in summer due in appropria Dean's Office *Wednesday*
August 23 Second 5-week session classes end *Thursday*
August 24 Second 5-week session examination day *Friday*

SCHOOL OF EDUCATION

June 11 First 3-week workshop session registration (10 am–7 pm *Monday*
June 12 First 3-week workshop session classes begin *Tuesday*
June 29 First 3-week workshop session classes end *Friday*
July 2 Second 3-week workshop session registration (9 am–6 pm) classes begin *Monday*
July 2 Six-week session registration (9 am–6 pm); classes begi *Monday*
July 2 Ed.D., Ed.S., and M.A. in Ed. July comprehensive examina tion applications due *Monday*
July 4 Holiday *Wednesday*
July 14 National Teacher Examinations *Saturday*
July 20 Second 3-week workshop session classes end *Friday*
July 21 Ed.D., Ed.S., and M.A. in Ed. comprehensive examination *Saturday*
July 23 Third 3-week workshop session registration (9 am–5 pm) classes begin *Monday*
August 10 Six-week session and third 3-week workshop session classes end *Friday*
August 10 Ed.D. dissertations completed in summer due *Friday*

FALL SEMESTER 1973–74

September 6–8 Registration—*Thursday–Saturday*

THE UNIVERSITY

TORY AND ORGANIZATION

E GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Colum- n College in the District of Columbia. The name of the institution was nged in 1873 to Columbian University and in 1904 to The George Wash- on University. The debt of the University to George Washington, whose e it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted on the establishment of a National University in the federal city. There he ed that, while being instructed in the arts and sciences, students from all ts of the country would acquire the habits of good citizenship, throwing off al prejudices and gaining at first hand a knowledge of the practice, as well the theory, of republican government. To further the materialization of his es, Washington left a bequest of fifty shares of The Potomac Company wards the endowment of a University to be established within the limits of District of Columbia, under the auspices of the General Government, if government should incline to extend a fostering hand towards it." The gress never extended "a fostering hand." The Potomac Company passed of existence, and Washington's bequest became worthless.

fully conscious of Washington's hopes, but motivated primarily by a great sionary urge and the need for a learned clergy, a group of dedicated isters and laymen sponsored a movement for the establishment of a college he District of Columbia. Inspired largely by the zeal and energy of the erend Luther Rice, they raised funds for the purchase of a site and peti- ed Congress for a charter. After much delay and amendment, Congress ted a charter which was approved by President Monroe on February 9, . To safeguard the College's nonsectarian character it provided "that per- of every religious denomination shall be capable of being elected Trustees; hall any person, either as President, Professor, Tutor or pupil, be refused ittance into said College, or denied any of the privileges, immunities, or ntages thereof, for or on account of his sentiments in matters of religion."

uring the entire time when the institution was known as Columbian Col- its activities were centered on College Hill, a tract of forty-six and a half between the present Fourteenth and Fifteenth Streets extending north Florida Avenue to somewhat beyond Columbia Road. The Medical School ocated downtown. For the better part of the Columbian University period, uildings of the University were situated along H Street between Thirteenth ifteenth Streets.

During the last half century the University's present plant has been d
oped in that section of the old First Ward familiarly known as "Foggy Bott
between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Ave
Within a few blocks are the White House, the Department of the Interior,
State Department, the World Bank, and many other governmental offices
international agencies. The area is not without its reminders of historic inte
to the University. President Monroe, who signed the Charter, lived at 2
Eye Street. The first President of the Board of Trustees, the Reverend Oba
B. Brown, was for fifty years the pastor of a church at Nineteenth and
Streets, and Washington selected Twenty-third and E Streets as the site of
National University he hoped to see established.

The University as it is now organized consists of Columbian College of A
and Sciences (undergraduate); the Graduate School of Arts and Sciences;
professional schools, which include the National Law Center and the scho
of Medicine, Engineering and Applied Science, Education, Government
Business Administration, and Public and International Affairs; the College
General Studies; the Division of University Students; and the Summer Sessio

The George Washington University is privately endowed and is governed
a self-perpetuating Board of Trustees of which the president is an ex offi
member.

ACADEMIC STATUS

The George Washington University is accredited by its regional accrediti
agency, the Middle States Association of Colleges and Secondary Schools.

The University is on the approved list of the American Association of U
versity Women and is a member of the College Entrance Examination Boa

The National Law Center is a charter member of the Association of Ame
can Law Schools and is approved by the Section of Legal Education and A
missions to the Bar of the American Bar Association. The School of Medici
is a member of the Association of American Medical Colleges and is one
the medical colleges which have been continuously approved by the Americ
Medical Association. Curricula of the School of Engineering and Applie
Science in Civil, Electrical, and Mechanical Engineering are accredited by t
Engineer's Council for Professional Development. The School of Education
a charter member of the American Association of Colleges for Teacher Edu
cation and is accredited by the National Council for Accreditation of Teache
Education for its Bachelor's and Master's degree programs. The School
Government and Business Administration has maintained full membership i
the Middle Atlantic Association of Colleges of Business Administration sinc
1961. It joined the Council on Graduate Education for Public Administratio
in 1966. By invitation, in 1968, the School became a charter academic mem
ber of the American Association of Collegiate Schools of Business Assembly
The programs in Public Accounting designed to prepare students for Certifie
Public Accountants examinations have been approved by the state boards o
New York and of Maryland. The Program in Hospital Administration is
accredited by the National Accrediting Commission on Graduate Educatio
for Hospital Administration. The Department of Chemistry is on the approved
list of the American Chemical Society. The graduate program in clinical psy
chology in the Department of Psychology is on the approved list of the Ameri
can Psychological Association.

EDUCATIONAL FACILITIES

The University Library.—The University Library contains over 545,000 volumes and, with the exception of the law and medical collections, is housed in the Library Building.

Regulations governing the use of the Library, the circulation of books, and the use of reserve books and periodicals are available at the service desks of the Library.

Other Library Facilities in Washington.—The student has access also to the Library of Congress, the Public Library of the District of Columbia and its branches, the Library of the Pan American Union, the Library of the Bureau of Railway Economics, the Library of the United States Department of Agriculture, the Library of the United States Office of Education, the National Library of Medicine, the Library of the Smithsonian Institution, and many other great special collections of the government departments.

Research Facilities of Washington.—The arrangement of the summer schedule of classes permits the full-time student to avail himself of the opportunity to study, at first hand, the working of the federal government and so to form a background for intelligent and useful citizenship.

In the departmental libraries of the federal government are a multitude of reports made by eminent specialists in all fields of science on the results of study and research in the bureaus, experimental stations, laboratories, museums, and observatories of the nation.

In addition to the governmental collections the student has available the research facilities of such scientific and educational groups, whose headquarters are situated in Washington, as the Carnegie Institution, the American Council on Education, the National Academy of Sciences, the National Research Council, the National Education Association, and the National Geographic Society.

CONSORTIUM OF UNIVERSITIES OF THE WASHINGTON METROPOLITAN AREA, INC.

The universities in Washington, D.C.—American University, Catholic University of America, *George Washington University,* Georgetown University, and Howard University—are associated in a Consortium through which they coordinate the use of their respective facilities; District of Columbia Teachers College, Gallaudet College, and Trinity College are associate members of the Consortium. Students in approved programs leading to degrees in any one of these institutions have the opportunity to select from the combined offerings of all particular courses which best meet their needs.

Participation is limited to campus degree candidates. The following, however, are excluded: students in Canon Law, Law, Dentistry, Medicine, and Theology.

In special courses such as private instruction (as in music or art) or tutorial study, if a special fee is charged, this fee is not covered by the Consortium agreement and must be paid by the individual student to the institution administering the course. Courses offered in Reserve Officer Training Corps programs are excluded. *A student may not take courses at another institution that is available at his own.*

The student registers and pays at his own institution for all Consortium courses.

See page 16 for information concerning registration for Consortium courses.

Foreign language courses (other than French, German, or Spanish) offer
during summer 1973 by Consortium universities are listed on pages 107–8.

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Lawrence Winkler, M.A., Ed.D., *Assistant Dean of the Summer Sessions*

THE SUMMER SESSIONS

THE PROGRAMS OF THE SUMMER SESSIONS have been planned to meet the needs of full- and part-time students.

During the summer of 1973, Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Engineering and Applied Science, the School of Government and Business Administration, the School of Public and International Affairs, and the Division of University Students offer courses in two 5-week sessions, with some graduate seminars and courses extending over an 8-week period. The School of Engineering and Applied Science also offers courses in a 7-week period. The National Law Center offers courses in three sessions, and the School of Education offers courses in a 6-week session and three 3-week workshop sessions.

The time at which each course is offered (session and hours) is stated at the end of the course description.

Admission

PPLICATION FOR ADMISSION OR READMISSION

HE APPLICATION FOR ADMISSION to degree candidacy should be accompanied by the appropriate application fee ($10, undergraduate; or $25, graduate). There is no application fee for the student who is applying for nondegree status in the Division of University Students.

ONDEGREE STATUS

pplication for nondegree status in the Division of University Students should be received, with any required credentials, by the Friday before the registration date of the session for which admission is sought (see Calendar, pages 5 and 6).

REE CANDIDACY

dents from secondary schools wishing to begin college as degree candidates, either the first or second term of the summer session, should apply during the fall term of the senior year. Preference will be given to students who submit applications and required credentials prior to March 1.

Undergraduate transfer students from other institutions, applicants for graduate programs, and *readmission applicants* must submit application and required

credentials prior to May 1 for the first summer session and June 1 for the second summer session.

Records presented become the property of the University and *cannot* be returned.

APPLICATION FORMS

The tearout postcard form inside the back cover of this catalogue may be used to request the Dean of the Summer Sessions to furnish the appropriate form for admission or readmission to the University for nondegree status or for a degree program. Students who attended the University in the spring semester of 1973 do not need to reapply to attend the Summer Sessions.

THE STUDENT NOT SEEKING A DEGREE

The student not seeking a degree from this University should complete application for admission to the Division of University Students. (See paragraph above.) This nondegree-granting division makes the work of the University available to five types of applicants, in accordance with the following requirements:

1. The student registered for a program leading toward a degree at another institution is admitted to the extent that facilities permit. No transcript of record is required unless the student has been subject to academic or disciplinary action. The student must be in good standing and eligible to continue in the institution last attended during the past academic year.*

2. The student over 21 years of age who is not working for a degree in this or another institution may be admitted to take courses for which he has adequate preparation, as determined by the department concerned. A transcript of record is not usually required. However, the student must be able to affirm that he is in good standing and eligible to continue in the institution last attended during the past academic year.*

3. Applicants under 21 years of age who have graduated from high school within the previous two years and who have not attended a college or higher institution may be admitted if they meet the entrance requirements of Columbian College of Arts and Sciences (see pages 24–25).

4. Under special conditions, recent secondary school graduates under 21 years of age who have been accepted by a regionally accredited university or college for the fall semester of 1973 may be admitted for the *summer session only* without filing a transcript if they submit a photostatic copy of their letter of unconditional acceptance.

5. Secondary school students applying for admission to the Secondary School Honors Program may be admitted in accordance with the requirements stated on pages 39–40.

THE STUDENT SEEKING A DEGREE

An applicant from a secondary school must

1. Send to his high school principal the high school record form provided by the University, with the request that the completed form be mailed *to the Office of Admissions.*

* No student is eligible for admission if he has been suspended within the past academic year.

2. Request that a report of College Entrance Examination Board test scores e sent to the Office of Admissions directly from the Educational Testing Serv-e, Princeton, N.J., or Berkeley, Calif. Every applicant is required to submit cores on the Scholastic Aptitude Test and the English Composition Achieve-ent Test. In addition, an Engineering applicant must take the Mathematics est (Level I or II).

The College Entrance Examination Board tests are preferred; however, the merican College Testing battery scores will be accepted. The applicant hould request that these scores be sent to the Office of Admissions directly rom the American College Testing Program, Iowa City, Iowa. It is recom-ended that the applicant take the tests in October of the senior year.

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n applicant who has attended one or more institutions of higher learning must quest each registrar to mail to the Office of Admissions a transcript of his rec-rd, even though credits were not earned. An honorable dismissal is required om the institution last attended.

The report of the Graduate Record Examination, the Miller Analogies Test, r the Admission Test for Graduate Study in Business, where applicable, should ccompany application to graduate degree candidacy.

Registration

STUDENT MAY NOT REGISTER FOR CLASSES until admission to the University s been approved by the appropriate office.

A student previously registered in this University who was not registered for mpus courses during the spring semester preceding this registration must pply for and receive a letter of readmission from the Office of Admissions ndergraduate and nondegree) or appropriate Dean's Office (graduate), be-re he is eligible for registration.

Registration days and hours are stated in the calendar at the front of this talogue. All students registering on June 11 and July 19 should report first the first floor of the University Library, 2023 G Street, N.W., where they ll be given materials and detailed information concerning registration pro-ures. On all other registration dates (Law excluded), packets will be dis-uted from the Office of the Registrar, Rice Hall, 2121 Eye Street, N.W.

Degree candidates in Law secure their registration packets and instructions the Office of the Dean of the National Law Center, Stockton Hall, 720 entieth Street, N.W.

Students planning to take courses in the first session and also in other sessions r in the summer may register at the first registration for *all* summer courses. dents who wish to register for the second five-week session, the second ses-n in Law, or the second three-week, the six-week, or the third three-week ion in Education may register on the stated registration dates for those ses-s or on any earlier summer registration date (see Summer Sessions Cal-r, pages 5–6). Tuition for all courses is due and payable in full at the e of registration.

Students expecting to complete requirements for degrees during the Summer ions must apply for graduation as a part of registration for the Summer ions and pay the appropriate fee.

In special instances, with the permission of the instructor, a person who has been admitted to the University may be registered as an auditor in a class without being required to take active part or to pass examinations. No academic credit will be allowed for such attendance. A student who takes a course as an auditor may not repeat it for credit.

REGISTRATION BY GW STUDENTS FOR CONSORTIUM COURSES

Students interested in taking courses at any of the other institutions in the Consortium of Universities of the Washington Metropolitan Area, Inc. (see page 9), should consult the program announcements of the other institutions. Consortium application forms and instructions are available from the Registrar after the student has obtained his registration packet.

In order to participate in the Consortium program (1) the graduate student must obtain the approval of his adviser and should ascertain from the department of the institution where the course is taught whether or not he is eligible for the course and whether there is space in the class, or (2) the undergraduate student must obtain the approval of his adviser and *must* ascertain from the department of the institution where the course is taught whether or not he is eligible for the course and whether there is space in the class. Specific inquiries should be addressed to the Registrar.

CHANGES IN PROGRAM OF STUDY

Changes in programs of study may be made only with the permission of the adviser or major professor and the dean or director of the college, school, or division concerned.

Students should consult the deans' offices concerning final dates on which changes in schedule may be made.

Fees and Financial Regulations*

THE FOLLOWING FEES have been adopted for the summer of 1973:

Tuition Fees

For each semester hour for students in colleges, schools, and divisions other than in the School of Engineering and Applied Science† $86.00

For each semester hour for students in the School of Engineering and Applied Science† 88.00

University Center Fee (charged all students registered on campus‡, nonrefundable)

For each semester hour for which the student registers 3.50

* For information on fees and financial regulations for law courses and programs, contact the Office of the Dean, the National Law Center.

† Candidates for Master's degrees in the School of Engineering and Applied Science and candidates for doctoral degrees who were in residence in the University prior to the 1967 Summer Sessions may complete their programs under the schedule for payment of tuition fees in effect prior to July 1, 1967.

‡ The maximum charge for any student during the entire Summer Sessions will be $37.50. Students in the College of General Studies are charged the University Center Fee only when registered for courses on campus.

ditional Course Fees

certain courses additional fees, such as laboratory and material fees, are rged as indicated in the course descriptions. These fees are due with the ion fee for the course. Breakage of apparatus is charged against the in- idual student. When breakage is in excess of the normal amount pro- ed for in the laboratory fee, the individual student will be required to such additional charges as are determined by the department concerned.

duation Fees

ociate in Arts	$10.00
helor's, Master's, Education Specialist, and Doctor's degrees	25.00
-Master's Graduate Certificate in Health Care Administration	25.00
for Binding Master's Thesis	10.00
for Microfilm Service and Printing Announcement of Final xamination (Doctoral candidates)	60.00

cial Fees

lication fee (undergraduate degree candidate) nonrefundable	10.00
lication fee (graduate degree candidate) nonrefundable	25.00
ission tests (when required)	6.00–12.00
-registration fee, for failure to register within the designated period	15.00
payment fee, charged for failure to make payments when due (see ayment of Fees," below)	15.00
ncial reinstatement fee, for reinstatement after financial encumbrance r nonpayment of fees (see "Payment of Fees," below)	35.00
rned check fee, charged a student whose check is returned because of ufficient funds or improper drafting	15.00
each examination to qualify for advanced standing and for each cial examination	5.00
ial Columbian College departmental examination for each course to ualify for receiving credit (advanced standing), waiver of requirement, *both*	25.00
lish test for foreign students (when required)	5.00
oratory check-out fee, for failure to check out of chemistry laboratory the date set by the instructor*	3.00
onal Teacher Examinations fee, for Bachelor of Arts in Education egree candidates	9.00–13.00
script fee, for each transcript of record	2.00

gistration on campus in the University entitles each student to the follow- University privileges: (1) the services of the Student Career Services Office; the use of the University Library; and (3) medical attention as described er "Student Health Service" (see pages 20–21). These privileges terminate n the student withdraws or is dismissed from the University.

YMENT OF FEES

student is permitted to complete registration or to attend classes until ees are paid. Fees for each session are due in advance at the time of stration.

*A student who drops a Chemistry course before the end of the session must check out of the atory at the next laboratory period.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of 8 per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his rights to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registered for credit.

WITHDRAWALS AND REFUNDS

Withdrawal from a course or from the University requires the permission of the dean of the college, school, or division in which the student is registered. Application must be made in person or in writing. Notification to an instructor is not an acceptable notice: all charges for courses dropped without the approval of the dean must be met by the student.

Authorization to withdraw and certification for work done will not be given to a student who does not have a clear financial record.

In authorized withdrawals and changes in schedule, cancellation of tuition charges and course fees will be made in accordance with the following schedule:

Session	*Per cent refund on or before the date listed*			
	90%	75%	50%	None
1st 5-week Session (June 11–July 18) & 6-week Courses (June 11–July 20)	June 14	June 19	June 25	after June 25
8-week Courses (June 11–Aug. 3) & 9-week Courses (June 11–Aug. 10)	June 15	June 20	June 26	after June 26
2nd 5-week Session (July 19–Aug. 24)	July 24	July 27	Aug. 2	after Aug. 2
1st 3-week Educ. Workshop (June 11–June 29)	June 13	June 15	June 19	after June 19
2nd 3-week Educ. Workshop (July 2–July 20)	July 3	July 6	July 10	after July 10
3rd 3-week Educ. Workshop (July 23–Aug. 10)	July 24	July 26	July 30	after July 30
Educ. 6-week Session (July 2– Aug. 10)	July 5	July 10	July 16	after July 16
Engineering 7-week Session (June 11–July 30)	June 15	June 20	June 26	after June 26

In no case will tuition be reduced or refunded because of absence from sses.

Payment applies only to the session for which a registration charge is in- rred and will not be credited to another session or term.

Students withdrawing from courses scheduled at times other than those in- ded in the list on the preceding page should consult the Student Accounts ice for information concerning refunds.

University Regulations

DENTS IN THE SUMMER SESSIONS are subject to the same regulations govern- students enrolled in a college, school, or division of the University during academic year. Degree candidates are referred to the catalogues of the ools in which they are registered. Nondegree students should consult the *dergraduate and Graduate Catalogue.*

Academic Credit.—The Summer Sessions are an integral part of the Univer- . Academic credit for completed work will be given toward the appropriate ees in the various colleges and schools of the University in accordance with r separate regulations and requirements.

Residence.—Summer Sessions work may be counted in residence but the can- te for a degree must satisfy the residence requirements of the school or col- concerned.

Academic Work Load.—No full-time student may take more than 7 semester rs of work during each 5-week session. No student employed more than 20 rs a week may take more than 4 semester hours of work during each ek session.

the School of Education, 3 semester hours constitutes a full-time program ull-time students in any one of the 3-week workshop sessions, and 6 semes- ours represents full-time work in the 6-week session.

the National Law Center the maximum amount of work that may be n in each session by a full-time student is 6 semester hours; by an em- ed student, 4 semester hours.

the School of Engineering and Applied Science the maximum amount of that may be taken in a session by a full-time student is 6 semester hours.

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right is reserved by the University to dismiss or exclude any student from University, or from any class or classes, whenever, in the interest of the nt or the University, the University Administration deems it advisable to .

e right is reserved by the University to make changes in programs without e whenever circumstances warrant such changes.

e University and its various colleges, schools, and divisions reserve the to modify or change requirements, rules, and fees. Such regulations shall o force whenever the proper authorities may determine.

e University is not responsible for the loss of personal property in any rsity building. A "Lost and Found" office is maintained on campus in afety and Security Office, Woodhull House, 2033 G Street, N.W.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

In general, the policy of the University is one of attempting to keep the student's record confidential and out of the hands of those who would use it for other than legitimate reasons. At the same time, the policy must be flexible enough not to hinder the student, the University, or the community in their legitimate endeavors.

No information concerning a student will be released except as noted below:

1. Information such as whether or not the student is currently enrolled, dates of attendance; verification of date and place of birth; degrees earned (if any), date, major field or area of concentration, and honors received; home and local addresses and telephone numbers; school, college, or division of enrollment, and class; verification of signature; name and address of parent or guardian.

2. The issuance of formal transcripts of record to recognized institutions of higher learning; the certification of academic achievement to the various recognized professional associations (law, medicine, engineering, education, etc.).

Additional information will be released only on written authorization from the student, or by court order or subpoena. If a subpoena is served, the student whose record is being subpoenaed will be notified and the subpoena will be referred to the University's legal counsel.

Government investigative agencies have no inherent right to access to student files and records. If expressly requested, properly identified representatives from federal, state, or local government agencies may be given the information listed under No. 1 above.

RECENTLY ESTABLISHED REGULATIONS

An Appendix (pages 109–11) contains regulations recently approved by the University's Board of Trustees.

Student Services and Activities

STUDENT HEALTH SERVICE

THE STUDENT HEALTH SERVICE is a general outpatient clinic designed to assist students registered on campus with their health needs. This Service is located at 935 22nd Street, N.W. (in the H.B. Burns Memorial Building).

Physicians are present during the summer sessions from 9 a.m. to 5 p.m. and from 6 p.m. to 9 p.m., Monday through Friday, and from 9 a.m. to 12 noon on Saturday. During hours when the Student Health Service is closed, on-campus students may contact consulting physicians for advice connected with illness or emergency by calling 223-2200 (the Medical Bureau). All callers should always identify themselves as George Washington University students and ask for the physician-on-call. For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. This arrangement is for emergency care only, and all fees are the responsibility of the student.

Any student may engage, if he so desires, physicians and nurses of his own choice, but he will be responsible for all the fees charged. The bills incurred

om all services rendered outside of the Student Health Service (for example, boratory and X-ray work and referrals to specialists or other outside phy-ians) are the responsibility of the student. Within the Student Health Serv-e, there will be only a few small charges for some services, such as materials r an allergy injection series, overseas immunizations, and certain other serv-es.

The Student Health Service is available to the student only during the ses-on in which he is enrolled.

Any student who intends to train for an athletic team is required to pass a orough medical examination. The University is not responsible for injuries eceived in intercollegiate or intramural games, or in any of the activities of e Department of Physical Education, Health, and Recreation.

E READING CENTER

e Reading Center offers individual diagnostic and corrective services for all els: primary, elementary, secondary, and adult. In addition, special reading provement classes are conducted for high school and college students as well other adults.

A complete diagnosis includes psychological tests; vision, hearing, dominance, d spelling tests; and various types of reading achievement and aptitude tests. sults are interpreted, and a written report is presented in conference with the ents or the individual.

The special reading improvement classes for high school students, college stu-nts, and other adults are offered throughout the year at stated intervals. Em-asis is placed on improvement of vocabulary, speed, comprehension, and dy skills. Instruction in spelling is also provided as needed. Mechanical aids ch as the tachistoscope, rate accelerator, and controlled reader are available increasing speed of comprehension.

Fees.—The fee for individual diagnosis is $75; for individual instruction, $8 esson; for semi-individual instruction, $6 a lesson; for instruction in small ups, secondary level, $5 a lesson. Reading classes (15 two-hour sessions) offered for adults, $125; for full-time George Washington University stu-nts, $60. All fees are payable in advance at the Office of the Cashier.

UNSELING CENTER

e Center offers to students enrolled in the University services which are de-ned to assist individuals in the diagnosis and treatment of their educational, sonal, and social problems; to diagnose problems leading to academic diffi-ties; to offer vocational counseling and programmed instruction; and to refer viduals to qualified agencies for assistance with problems not handled by the ter. Behavior therapy, individual and group psychotherapy, and individual group counseling are available.

The Center also provides special assessments including diagnostic measures scribed by the School of Engineering and Applied Science, admissions tests the University and for other selected educational institutions, and some ested assessments for business and industry.

ees.—Students who are currently registered as degree candidates in the Uni-sity are entitled to one interview free of charge. If the student decides to tinue to use the services offered, a minimum flat fee of $30 will be charged short-term treatment. Fees for testing and long-term treatment depend upon ervices involved. All fees are payable at the Counseling Center Office.

THE SPEECH AND HEARING CLINIC

The Speech and Hearing Clinic offers diagnostic and remedial work for children and adults with such communication difficulties as stuttering, lisping, cleft palate speech, and cerebral-palsied speech; and with voice, articulatory, and hearing problems. Diagnostic and remedial work is also available for persons with nonstandard language usage due to such conditions as hearing loss, brain damage, mental retardation, and environmental factors.

Fees.—The fee for an initial evaluation is $20. Fees for additional specialized testing are dependent on the testing involved. The fees for individual speech or hearing therapy range from $3 to $10 a session. Fees are reduced for full-time students enrolled in the University and for persons receiving group therapy. Fees are payable at the Office of the Cashier.

VETERANS EDUCATION

The Office of the Registrar assists students entitled to educational benefits as veterans or war orphans with any problems which may arise concerning their benefits. This Office also processes certification of enrollment and attendance to the Veterans Administration so that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or war orphans should consult the Office of the Registrar prior to submitting application to the Veterans Administration. All such students should obtain the instruction sheet issued by the Office of the Registrar, which sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration, and which includes other information of general interest.

The Veterans Administration is at 2033 M Street, N.W., Washington, D.C. 20421.

RESIDENCE HALL

Men, women, and married couples (no children) will be housed in Thurston Residence Hall, 1900 F Street, N.W. This is a modern, air-conditioned building.

Admission to the University does not include a room reservation. A separate application for a room should be made well in advance.

RESIDENCE HALL RATES FOR 1973 SUMMER SESSIONS*

	Multiple Occupancy	*Single Occupancy*
Monthly	$120.00	$160.00
Weekly	30.00	40.00
Daily	7.00	9.00
Each regular 5-week Session	150.00	200.00

Residence hall payments are due and payable in advance. A student who fails to meet payment is subject to automatic suspension.

Forms for application, together with detailed information, may be obtained from the Director of Housing.

Information concerning off-campus housing near the University is available at the Office of the Director of Housing.

* The rates include linen service. Rates shown are subject to change.

LOYD HECK MARVIN CENTER

he Cloyd Heck Marvin Center houses a wide range of facilities that provide ervices and conveniences in an informal setting which may foster useful social elationships among members of the University community. The Center offers variety of programs conducted by the University Program Board, performing rts departments, and other student and faculty organizations.

A two-board structure, representative of all elements of the University comunity, plays an important role in the day-to-day functioning of the Center. he Governing Board and the Operations Board work closely with the full-me staff in the development of procedures and policies which provide a ramework for the Center's operation.

TUDENT AND ALUMNI CAREER SERVICES OFFICE

he Student and Alumni Career Services Office provides assistance to degree ndidates and alumni seeking full-time, part-time, temporary, or permanent mployment.

The Office maintains a registry of positions available in many fields, both cally and nationally, and refers qualified applicants for consideration. The ffice administers the On-Campus Industrial and Government Recruitment Inview Program for seniors and graduate students, in which private companies, overnment agencies, service organizations, public school systems, and universis participate. The Office also handles the referral and placement functions of e on-campus College Work-Study Program. Prospective teachers may estabsh permanent credentials files in the Student and Alumni Career Services Ofe. This service includes files for alumni seeking college and university facty and administrative positions. The Office also provides individual interviews r students and alumni wishing career guidance.

CIAL AND RECREATIONAL PROGRAM

e social and recreational program includes many varied activities and schedd events. In addition to this campus program a great abundance of cultural well as social and recreational opportunities is available to persons living in e metropolitan area. During the summer the University posts a weekly guide these events on a bulletin board in the Cloyd Heck Marvin Center.

THE COLLEGES, SCHOOLS, AND DIVISIONS

INFORMATION CONCERNING SPECIFIC REQUIREMENTS for degrees is omitted from this catalogue. For such information and other pertinent regulations, the student is referred to the catalogue of the school concerned.

COLUMBIAN COLLEGE OF ARTS AND SCIENCES

Since its founding in 1821, Columbian College has been the liberal arts unit of the University, offering baccalaureate degrees in all the traditional areas of the arts and sciences. Under a new academic plan, students have wide options in developing their academic programs, in earning advanced standing by examination, in devising interdepartmental majors, and, if qualified, in working toward a new three-year program leading to the regular degrees. Students are encouraged to select their major field as soon as possible, hopefully no later than the end of their freshman year. From that time, they receive their academic advice and guidance from the chosen major-field department. In addition to fulfilling major-field requirements, students are expected to broaden their cultural foundations in the Humanities, the Social Studies, and the Natural and the Mathematical Sciences. The College also provides prelegal and premedical programs and also the preprofessional work required for admission to the School of Education and to the School of Public and International Affairs.

THE DEGREES

Columbian College offers work leading to the following degrees: Associate in Arts, Bachelor of Arts, and Bachelor of Science. In cooperation with the School of Medicine, Columbian College offers work leading to the combined degrees of Bachelor of Arts and Doctor of Medicine. In cooperation with the Department of Pathology and the University Hospital, Columbian College offers work leading to the degree of Bachelor of Science in Medical Technology. Columbian College grants the following degrees to students in off-campus programs administered by the College of General Studies: Associate in Arts in General Studies, Bachelor of General Studies, Bachelor of Science in Environmental Health, Bachelor of Science in Geodetic and Cartographic Science, and Bachelor of Science in Oceanography.

ENTRANCE REQUIREMENTS

Requirements for admission to the freshman class are as follows:

1. An acceptable certificate of graduation from an accredited secondary
hool, showing at least fifteen units which must include four years of English;
least two years of one foreign language; two years of science, preferably with
oratory instruction; two years of social studies, one of which must be Amer-
history; and two years of college preparatory mathematics. It is to be noted
one unit of algebra, or the equivalent, is prerequisite to courses in chemis-
and statistics, and that one unit in algebra and one unit in plane geometry,
the equivalent, are prerequisite to courses in mathematics and physics.
2. The principal's statement that the applicant is prepared to undertake col-
work.
3. College Entrance Examination Board scores, which must be submitted on
Scholastic Aptitude Test and the English Composition Achievement Test.*
A person who does not present all of the formal requirements stated above
request the Office of Admissions to present his case to the Columbian Col-
Committee on Admission and Advanced Standing. The Committee may
cribe appropriate tests.
The applicant is responsible for
ending the report form obtained from the Office of Admissions to his high
chool principal who will complete the form and forward it directly to the
Office of Admissions.
Requesting a report of scores on the Scholastic Aptitude Test and the Eng-
ish Composition Achievement Test to be sent to the Office of Admissions by
the Educational Testing Service, 20 Nassau Street, Princeton, N.J. 08540, or
1947 Center Street, Berkeley, Calif. 94704.

OR FIELDS

ricula leading to the degree of Bachelor of Arts are available in the follow-
major fields:

erican Civilization
erican Literature
hropology
ied Mathematics
ied Statistics
History
gy
ny
histry
ese Language and Literature
ical Archeology and Anthropology
ical Archeology and Classics
ical Humanities
atic Art
omics
h Literature
Arts
h Language and Literature
raphy
gy
anic Languages and Literatures
y
alism
Latin
Latin American Studies
Mathematical Statistics
Mathematics
Music:
  Applied Music
  Music History and Literature
  Music Theory
Philosophy
Physics
Political Science
Psychology
Religion
Russian Language and Literature
Russian Literature and Culture—in Translation
Sociology
Spanish American Literature
Spanish Language and Literature
Speech Communication
Speech Pathology and Audiology
Zoology

ge 15 for American College Testing Program.

Curricula leading to the degree of Bachelor of Science are available in t
following major fields:

Applied Mathematics
Applied Statistics
Biology
Botany
Chemistry
Geology
Mathematical Statistics
Mathematics
Physics
Zoology

THE GRADUATE SCHOOL OF ARTS AND SCIENCES

The Graduate School offers work leading to the following degrees: Master o
Arts, Master of Arts in Special Studies, Master of Fine Arts, Master of Music
Master of Science, Master of Science for Teachers, Master of Science i
Forensic Science, Master of Science in Special Studies, and Doctor of Philos
ophy. In cooperation with the School of Medicine, the Graduate School offer
work leading to the combined degrees of Master of Science and Doctor o
Medicine or Doctor of Philosophy and Doctor of Medicine. The degrees o
Master of Arts in Special Studies and Master of Science in Special Studies ar
designed for students who do not wish to concentrate in a specific field such
as those listed below under "Graduate Fields," but instead are interested i
interdisciplinary programs. It is possible to group several of these fields to-
gether to make an interdisciplinary program; the program of studies is deter-
mined by the student in consultation with the Dean of the Graduate School.

ENTRANCE REQUIREMENTS

The entering graduate student must have an approved Bachelor's degree from
an accredited higher institution, an appropriate distribution of courses, and a
superior quality of work in the major field. Entering graduate students work-
ing toward the degree of Master of Science for Teachers must also have ex-
perience in teaching mathematics at the secondary school level.

GRADUATE FIELDS

Subject	Degrees Offered	
I. Humanities		
American Civilization	M.A.	Ph.D.
American Literature	M.A.	Ph.D.
Art:	M.F.A.	
Ceramics		
Design		
Graphics		
Painting		
Photography		
Sculpture	M.A.	
Art History	M.A.	
Art Therapy	M.A.	
Classical Archeology, Classics, and History	M.F.A.	Ph.D.
Dramatic Art	M.A.	Ph.D.
English Literature	M.A.	
French Literature	M.A.	
Germanic Languages and Literatures		

Subject	Degrees Offered	
Museum Training	M.A.	
Music:	Mus.M.	
Applied Music		
Conducting		
Music Composition		
Music Theory		
Musicology	M.A.	
Philosophy	M.A.	
Religion	M.A.	
Religion and Medical Care	M.A.	
Religious Education	M.A.	
Russian Language and Literature	M.A.	
Spanish American Literature	M.A.	Ph.D.
Spanish Literature	M.A.	Ph.D.
Social Sciences		
Anthropology	M.A.	
Economics	M.A.	Ph.D.
Geography	M.A.	
History	M.A.	Ph.D.
International Relations		Ph.D.
Political Science	M.A.	Ph.D.
Sociology	M.A.	Ph.D.
Physical and Mathematical Sciences		
Applied Mathematics	M.A., M.S.	
Applied Statistics	M.S.	
Chemistry	M.S.	Ph.D.
Forensic Science	M.S. in Forens.S.	
Geochemistry	M.S.	Ph.D.
Geology	M.A., M.S.	Ph.D.
Mathematical Statistics	M.A.	Ph.D.
Mathematics	M.A.	Ph.D.
Physics	M.A.	Ph.D.
Biomedical and Related Sciences		
Anatomy	M.S.	Ph.D.
Biochemistry	M.S.	Ph.D.
Biological Sciences	M.S.	Ph.D.
Genetics	M.S.	Ph.D.
Human Ecology		Ph.D.
Microbiology	M.S.	Ph.D.
Mycology	M.S.	
Pathology	M.S.	Ph.D.
Pharmacology	M.S.	Ph.D.
Physiology	M.S.	Ph.D.
Psychology	M.A.	Ph.D.
Speech Pathology and Audiology	M.A.	

School of Public and International Affairs offers a Master of Arts field in International
, Botany, and Zoology.

THE NATIONAL LAW CENTER

The National Law Center offers work leading to the degrees of Juris Doc
Master of Laws, Master of Comparative Law, Master of Comparative L
(American Practice), and Doctor of Juridical Science.

Forms for application for admission and information concerning course of
ings may be obtained from the Office of the Dean of the National Law Cent
720 Twentieth Street, N.W., Washington, D.C. 20006.

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE

The School of Engineering and Applied Science offers courses leading to t
degree of Bachelor of Science in the following areas: Civil Engineering (wi
Environmental Civil Engineering option), Electrical Engineering (with Comput
Science option), and Mechanical Engineering. Graduate programs lead to th
degrees of Master of Science, Master of Engineering Administration, and Do
tor of Science. The School also grants the degrees of Master of Science an
Master of Engineering Administration to students in off-campus programs a
ministered by the College of General Studies.

ENTRANCE REQUIREMENTS FOR THE BACHELOR OF SCIENCE DEGREE

The School admits those applicants who can benefit themselves and society b
disciplined intellectual effort in its environment.

Admission is the first selective step in a long series of qualifying steps th
student will take in his progress toward professional competence in engineering
It indicates the School's belief that the applicant has at least the minimum
preparation and ability to complete the curriculum successfully.

The applicant must be of good character and must have an academic back
ground appropriate for the program of studies contemplated.

Consideration for admission is based on the following:

1. An acceptable certificate of graduation from an accredited high school
showing at least fifteen units*;

2. The principal's statement that the applicant is prepared to undertake col-
lege work;

3. Scores on the following College Entrance Examination Board tests: the
Scholastic Aptitude Test, the English Composition Achievement Test, and a
Level I (Standard) or Level II (Intensive) Mathematics Test—Level I preferred.

The qualifications of applicants who, because of unusual circumstances, do
not meet the above requirements will be considered by the School, which may
prescribe admission tests.

Nine and one-half of the fifteen units required for entrance must be distribu-
ted as follows: three in English, two in algebra, one in plane geometry, one-half
in plane trigonometry, one in physics or chemistry, and two in one foreign
language or history. General science may not be counted in satisfaction of the
science requirement but may be counted as an elective unit.

It is recommended that *both* physics and chemistry be studied in high school.
A high school course in solid geometry is recommended as a firm foundation
for college mathematics.

* A unit represents a year's study in a secondary school subject, including in the aggregate not
less than 120 sixty-minute periods of prepared classroom work.

An applicant must arrange to have sent directly *from his school to the Office of Admissions of the University* the academic record of his first seven terms in ondary school, together with a personal evaluation and recommendation om his principal. This information may be supplied on a form provided by e University or on a standard form used by the secondary school provided essential information is included.

Quantitative Deficiency.—A graduate of an approved high school who lacks more than two units of the required subjects and who presents fifteen ac- ptable units may be admitted to a prescribed program which includes courses make up his deficiencies.

TRANCE REQUIREMENTS FOR THE MASTER'S DEGREES

mission to graduate study toward a Master's degree requires an appropriate chelor's degree from a recognized institution and evidence of capacity for ductive work in the field selected, as indicated by undergraduate grades, aduate Record Examination scores, and similar data.

An applicant who has significant deficiencies in preparation may be required ake prescribed undergraduate courses as an unclassified student before being itted to graduate student status. In some cases, if such deficiencies are imal, he may be admitted to graduate student status and allowed to take a ted number of graduate courses while completing the undergraduate courses which he is deficient. In no case may the undergraduate courses thus taken ill any part of the requirements for the Master's degree.

TRANCE REQUIREMENTS FOR THE DOCTOR'S DEGREE

atisfactory Master's degree from an accredited institution is required, to- her with acceptable personal qualities and a capacity for creative scholar- . Normally, a *B* average in graduate work is required. However, the mini- m does not assure automatic acceptance; the departments may, and often do, higher admission standards. The prospective doctoral student seeking ad- ion should apply before June 1 for the fall semester and before December or the spring semester. Personal interviews may then be arranged to discuss applicant's qualifications and the possibilities for an effective doctoral pro- m. The applicant must arrange for complete documentary records (tran- pts) to be forwarded to the Director of Engineering Admissions in sufficient e to permit assembly of complete records for evaluation as soon after the ve application deadlines as possible.

he applicant must arrange for letters of recommendation to be submitted two faculty members of the institution from which he received his Mas- degree; one of these, if possible, should be from his Master's adviser. The rs should be addressed to the appropriate department chairman.

THE SCHOOL OF EDUCATION

School of Education prepares teachers, counselors, and administrators for igher ranges of educational service and offers opportunities to experienced ers to extend their education. The schedule of courses is arranged to the needs of employed students as well as those able to devote full time to studies. Students pursuing programs involving teacher certification must

make arrangements to student-teach in the fall or spring semester during h
when public schools are in session. The School offers both graduate and un
graduate work.

THE DEGREES

The School of Education offers work leading to the following degrees: Bache
of Arts in Education, Bachelor of Science in Physical Education, Master of A
in Education, Master of Arts in Teaching, Education Specialist, and Doctor
Education. The School also grants the degree of Master of Arts in Educati
to students in the off-campus programs administered by the College of Gene
Studies.

ENTRANCE REQUIREMENTS

For the Bachelor's Degrees.—The satisfactory completion of two years
approved college work, or graduation from an approved two-year college, or t
equivalent, is required.

For the Degree of Master of Arts in Education.—Candidates whose unde
graduate preparation does not include equivalents of the basic requiremen
for the degree of Bachelor of Arts in Education must make up deficiencies an
may be required to take designated tests.

For the Degree of Master of Arts in Teaching.—To be admitted as a studen
intern, an applicant must (1) have a Bachelor's degree from an accredited lib
eral arts institution, including courses related to the general education require
ments for teacher certification; (2) show evidence of interest in children and
sincere desire to teach; (3) submit three written references attesting to qualit
of academic record and personality; (4) submit a score on the Aptitude Tes
of the Graduate Record Examination or the Miller Analogies Test; and (5) b
interviewed by the University Selection Committee, or under arrangement
specified by the Committee and approved by the Dean of the School of Edu
cation.

For the Degree of Education Specialist.—The degree of Master of Arts in
Education from this University, or the equivalent; a satisfactory score on the
Miller Analogies Test or the Graduate Record Examination; and two years of
successful pertinent experience are required. Each applicant must be inter-
viewed and recommended by a staff member of the School of Education or by
a representative in the candidate's locality appointed by the Dean.

For the Degree of Doctor of Education.—The applicant must have adequate
preparation for advanced study, including graduate work in fields prerequisite
to his objective equivalent to that required for the degree of Master of Arts in
Education at this University, at least three years of successful pertinent educa-
tional experience, acceptable personal qualities, and capacity for creative schol-
arship and effective leadership.

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION

The School of Government and Business Administration offers work leading to
the following degrees: (1) Bachelor of Business Administration with a major
in Accounting or Business Administration; (2) Master of Arts in Government

the fields of Personnel Management, Public Administration, or Urban and gional Planning; (3) Master of Arts in Health Care Administration; (4) ster of Business Administration with fields of concentration in Accounting, avioral Factors in Administration, Business-Government Relations, Finance d Investments, Health Care Administration, Information Technology, Inter- sional Business, Managerial Economics, Marketing, Operations Research and stems Analysis, Personnel Management, Procurement and Contracting, Re- rch and Development—Policy and Management, or Transportation; (5) ster of Public Administration in the fields of Health Care Administration, sonnel Management, Public Administration, or Urban and Regional Plan- g; (6) Master of Urban and Regional Planning; (7) Post-Master's Gradu- Certificate in Health Care Administration; (8) Doctor of Business Admin- ation; and (9) Doctor of Public Administration. The School also grants degrees of Bachelor of Science in Administration and Master of Science in inistration to students in off-campus programs administered by the College General Studies.

TRANCE REQUIREMENTS FOR THE BACHELOR'S DEGREE

quirements for admission to the freshman class are as follows:
1. An acceptable certificate of graduation from an accredited secondary ool, showing at least fifteen units which must include four years of English; east two years of one foreign language; two years of science, preferably with oratory instruction; two years of social studies, one of which must be Amer- history; and two years of college preparatory mathematics. It is to be ed that one unit of algebra, or the equivalent, is prerequisite to courses in istry and statistics, and that one unit in algebra and one unit in plane metry, or the equivalent, are prerequisite to courses in mathematics and ics.
2. The principal's statement that the applicant is prepared to undertake ge work.
3. College Entrance Examination Board scores, which must be submitted on Scholastic Aptitude Test and the English Composition Achievement Test.* person who does not present all of the formal requirements stated above request the Office of Admissions to present his case to the School of Gov- ent and Business Administration. The School may prescribe appropriate

e applicant is responsible for
nding the report form obtained from the Office of Admissions to his high chool principal who will complete the form and forward it directly to the ffice of Admissions.
equesting a report of scores on the Scholastic Aptitude Test and the Eng- h Composition Achievement Test to be sent to the Office of Admissions by e Educational Testing Service, 20 Nassau Street, Princeton, N.J. 08540, 1947 Center Street, Berkeley, Calif. 94704.

NCE REQUIREMENTS FOR THE MASTER'S DEGREES

chelor's degree from an accredited college or university, that includes at 90 semester hours of academic work with a quality-point index of 3.00 erage) in the relevant undergraduate field, is required.

*See 15 for American College Testing Program.

Applicants for admission to all Master's degree programs are required take either the Admission Test for Graduate Study in Business or the aptit sections of the Graduate Record Examination, both of which are administe by the Educational Testing Service. Master of Business Administration ap cants must submit scores on the Admission Test for Graduate Study in Bu ness; Master of Arts in Government, Master of Arts in Health Care Admin tration, Master of Public Administration, or Master of Urban and Regio Planning applicants may submit scores on either the Admission Test for Gra uate Study in Business or the Graduate Record Examination. Any test sco submitted must have been recorded within three years of the date of application

ENTRANCE REQUIREMENTS FOR THE DOCTOR'S DEGREES

Doctor of Business Administration.—The degree of Master of Business A ministration, Master of Arts in an approved field, or the equivalent, togeth with acceptable personal qualities and a capacity for creative scholarship, required. Applicants must file results of the Admission Test for Gradua Study in Business administered by the Educational Testing Service.

Doctor of Public Administration.—The degree of Master of Public Admini tration, Master of Arts in an approved field, or the equivalent, together wit acceptable personal qualities and a capacity for creative scholarship, is required Applicants must file results on either the Admission Test for Graduate Study i Business *or* the aptitude sections of the Graduate Record Examination admin istered by the Educational Testing Service.

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS

The School of Public and International Affairs offers work leading to the de grees of Bachelor of Arts with a major in Chinese Language and Literature, Chinese Studies, International Affairs, Public Affairs, or Urban Affairs; Master of Arts in the fields of International Affairs, Latin American Studies, Public Affairs, Russian Studies, and Science, Technology, and Public Policy.

ENTRANCE REQUIREMENTS FOR THE BACHELOR OF ARTS DEGREE

With a major in Chinese Language and Literature, Chinese Studies, International Affairs, Public Affairs, or Urban Affairs.—The satisfactory completion of the appropriate curriculum for the freshman and sophomore years in Columbian College of Arts and Sciences, or the equivalent, is required.

ENTRANCE REQUIREMENTS FOR THE MASTER OF ARTS DEGREE

A Bachelor's degree from an accredited college or university is required. Students admitted to candidacy must have attained a *B* average or equivalent in the relevant undergraduate fields.

In the field of International Affairs.—The applicant's undergraduate program should include background courses corresponding to an undergraduate major in international affairs at this University.

In the field of Latin American Studies.—An undergraduate major in Latin American Studies is normally required. Majors in other fields may be considered provided their record includes sufficient course work in three of the

following: Anthropology, Economics, Geography, Hispanic Literature, History, and Political Science.

In the field of Public Affairs.—An undergraduate major in public affairs, economics, history, or political science, depending on the field of specialization, is required.

In the field of Russian Studies.—The applicant's undergraduate program should include appropriate background courses in history, political science, and Russian language.

In the field of Science, Technology, and Public Policy.—No particular undergraduate concentration is required. The desirable qualifications are both superior competence in a specific discipline and potential aptitude for cross-disciplinary work.

THE COLLEGE OF GENERAL STUDIES

The College of General Studies administers the off-campus degree programs under which Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Engineering and Applied Science, the School of Education, the School of Government and Business Administration, and the School of Medicine have degree-granting authority. The College also offers credit courses in liberal arts, education, and business administration for which there is sufficient demand. Special programs are offered to meet the in-service needs of specified groups. As a community service, a regular program of non-credit courses without entrance requirements is also offered.

ENTRANCE REQUIREMENTS

Off-campus Credit Courses.—A simplified procedure is used for admission and registration in off-campus courses. Transcripts of previous academic work are not required. Registration is restricted to those whose qualifications would indicate that they are able to carry the course successfully. Registration in an off-campus course does not constitute admission to degree candidacy in the University.

Noncredit Courses.—In general, noncredit courses will be open to any individual interested in enrolling. When a noncredit course is organized at the request of some particular agency or group, admission may be restricted to the students recommended by the sponsoring organization. A limit on the size of classes may have to be imposed in order to maintain the quality of instruction.

A separate catalogue of the College of General Studies, available at the College, 706 Twentieth Street, N.W., Washington, D.C. 20006, contains full information concerning programs, courses, entrance and degree requirements, and

THE DIVISION OF UNIVERSITY STUDENTS

The Division of University Students makes the work of the University, in its several colleges and schools, accessible to five types of students who are not working toward a degree in this University (see page 14).

SPECIAL PROGRAMS AND WORKSHOPS

THE SUMMER SESSIONS is pleased to announce a carefully planned group of special programs and workshops devised to serve a variety of student needs and to utilize resources which are uniquely present at the University and in the nation's capital. These programs, which are described below, have been developed in many areas. They all have a strong academic orientation and will be taught by the regular faculty of the University or distinguished visitors from other institutions.

American Folklore Seminar at Wolf Trap Farm

A THREE-WEEK COURSE—JULY 9 TO JULY 29

THIS INTENSIVE THREE-WEEK SEMINAR AND WORKSHOP covers the various aspects of traditional cultures in the United States. Though the primary emphasis is on the mainstreams of traditional cultures (Anglo- and Afro-American), it also deals with American Indians, Pennsylvania Germans, and other ethnic groups. Folklore topics, presented from both historical and contemporary points of view, include narrative, song, music, dance, religion, games, proverbs, riddles; folk art, architecture, and craft; library and field methodology in folklore research; folk museums and archives; and the revival and/or preservation of crafts. Students will be actively involved in the organization and operation of folklore societies and folk festivals during the second part of the course.

This course is sponsored jointly by the University and the National Folk Festival Association and will be taught on the rural campus of Madeira School, near historic Wolf Trap Farm Park, where the 35th National Folk Festival will be held in late July. Room and board are available at the School. The course will be taught by Charles L. Perdue, Jr., Assistant Professor of Folklore at the University of Virginia; and distinguished guest lecturers from the Smithsonian Institution, the Library of Congress, and regional universities and museums will be frequent visitors. Students will gain some familiarity with the current manifestations of traditonal cultures in this country—both through discussion and participation—and will receive theoretical guidance and practical experience in applied folklore.

Application forms and additional information are available from the director of the seminar, Victor K. Golla, Assistant Professor of Anthropology, George Washington University, Washington, D. C. 20006.

THROPOLOGY

254A **Seminar: Folklore in America** (6) Perdue and Staff

Intensive seminar covering the various aspects of American traditional culture, including the theory and methodology of folklore research. Primary emphasis on Anglo- and Afro-American traditional cultures, with some consideration of other ethnic groups. MTWThF 9 am–4 pm.

Art and Archeology Program in Italy

GUST 1 TO AUGUST 31

DEPARTMENT OF ART, in cooperation with the Etruscan Foundation and College of General Studies, is offering a four-and-one-half-week study of uscan civilization at the Villa Spannochia, a private estate in central Italy, r the art centers of Siena and Florence. Professor William A. MacDonald direct the program, and Italian lecturers will include Dante Piccini, Chief torer in the Department of Antiquities, Etruria, and Professor Enzo Mazhi, Honorary Superintendent of Antiquities, Department of Siena.

tudents enrolling in the program will live at the Villa Spannochia, which es as headquarters for the Etruscan Foundation. Weekday mornings will ccupied by lectures and discussion groups on the highly developed but rela- y little known Etruscan civilization, tracing the influences of other early izations and the impact on the later Roman culture. During the afternoons, ps of ten to fifteen students will participate in excavation work at nearby scan tombs. Students may register at the College of General Studies, and may register for undergraduate or graduate credit.

dditional information, including cost of travel and tuition, may be obtained n William A. MacDonald, Professor of Art and Archeology, Building H, m 100, George Washington University, Washington, D.C. 20006.

141 **Etruscan Art and Archeology** (6) MacDonald and Staff

Dance Workshop

4 TO JUNE 22*

PROGRAMS IN DANCE of the Department of Physical Education, Health, Recreation are offering a three-week workshop in modern dance, under irection of Sharon Leigh Clark, Associate Professor of Physical Educa- The artist-in-residence will be Don Redlich, assisted by Irene Feigener. A course in Movement for Actors will be included in the workshop. ncert featuring the guest artist-in-residence and students from the repertory will be presented in the Marvin Theatre at the end of the session. The

es begin June 4. Registration June 4, 9 a.m. to 5 p.m., Building K.

workshop is open to both graduate and undergraduate students with previous experience in dance. From 1 to 4 semester hours of credit may be earned, or courses may be audited. Graduate credit in the program may be arranged.

Additional information may be obtained from Sharon Leigh Clark, Coordinator, Dance Programs, Building J, George Washington University, Washington, D.C. 20006.

PHYSICAL EDUCATION, HEALTH, AND RECREATION

116A **Movement for Actors** (1) Feigenheimer
Movement exploration and body awareness through dance technique and improvisation. MTWThF 11:30 am–1 pm.

118A **Special Problems in Dance Composition** (1) Redlich
Exploration of effect of time, space, and energy upon movement, developing into group and solo composition. MTWThF 11:30 am–1 pm.

120A **Repertory** (1 or 2) Redlich
Creation of a new work to be performed in concert at the end of the workshop. Admission by permission of instructor. May be repeated for credit not to exceed 4 semester hours. MTWThF 2–3:30 pm.

121A **Dance Technique I** (1) Feigenheimer
Intermediate/advanced modern dance. May be repeated once for credit. MTWThF 9:30–11 am.

123A **Dance Technique II** (1 or 2) Redlich
Advanced modern dance. May be repeated for credit not to exceed 4 semester hours. MTWThF 9:30–11 am.

Field Research in Historical Archeology

JUNE 17 TO AUGUST 24

GEORGE WASHINGTON UNIVERSITY's Department of Anthropology and American Studies Program, in cooperation with the Smithsonian Institution and the St. Mary's City Commission, a new historical agency of the State of Maryland, offer basic instruction and field training in historical archeology. In an intensive ten-week program students will excavate an early Colonial plantation at St. Mary's, a Yeocomico Indian village which became the 17th century capital of Maryland. Today the site is occupied by the campus of St. Mary's College of Maryland and a state historic park. The summer program is designed to acquaint young scholars with historical archeology while recovering information needed for the development of the historic site.

Participants receive practical field experience in digging, record keeping, drawing, photographing, and surveying. Afternoon classes include instruction in making site maps, using a dark room, and identifying artifacts. In rotation, students work in the laboratory and assist in directing the excavation. Weekly seminars, led by staff members and visiting scholars, explore the broader implications of archeology for the study of history and archeology.

The program will be taught by the archeological staff of the St. Mary's City ommission under the direction of Garry W. Stone. The Commission's affiliaon with the Smithsonian Institution and George Washington University will ing to the program specialists in history, anthropology, and archeology, inluding from the Smithsonian Wilcomb E. Washburn, Harold Skramstad, J. fferson Miller II, and Melvin H. Jackson; from George Washington Univer- Robert L. Humphrey, Jr., and Bernard Mergen; and from the National eographic Society George E. Stuart.

Complete applications must be submitted by April 1. For information and pplications write to Robert L. Humphrey, Jr., Associate Professor of Anthroology, or Bernard M. Mergen, Assistant Professor of American Civilization, eorge Washington University, Washington, D.C. 20006.

ERICAN CIVILIZATION OR ANTHROPOLOGY

294A **Field Research in Historical Archeology** (3)

Field techniques, including excavation, recording, photography, preservation, laboratory analysis and interpretation, supplemented by seminars on the history, ethnography, and ethnohistory of 17th century St. Mary's City, Md.

Movement Education Workshop

Y 9 TO MAY 18

E PURPOSE OF THIS WORKSHOP is to help teachers gain insight into the owledge and skills necessary to solve current problems in movement educa. Problems to be considered will include introducing movement education public school programs, innovative equipment, individualizing instruction, ceptual-motor training programs, early childhood programs, etc. Outside cialists from the fields of early childhood and physical education will assist he workshop.

Preregistration by April 20 is required. The workshop is open to both grade and undergraduate students. Three semester hours of credit may be ed, or the course may be audited. Graduate credit may be arranged. Stus taking the course for credit must be admitted to the University.

Preregistration form and additional information may be obtained from ne Snodgrass, Associate Professor of Physical Education, Building K, rge Washington University, Washington, D.C. 20006.

SICAL EDUCATION, HEALTH, AND RECREATION

184A **Workshop in Physical Education** (3) Snodgrass and Staff

Problems in movement education. May 9 to 11 and 16 to 18: 5–9 pm; May 12 to 15: field activities, as arranged.

Russian-East Asian Studies

THE INSTITUTE FOR SINO-SOVIET STUDIES is offering a program of related courses focused on Russia, Eastern Europe, and East Asia. These courses are broad enough to have general appeal as electives for the liberal arts student and sufficiently specific to have vocational utility for the teacher of social studies. Regular faculty members will offer twelve courses in this program, eight in the first session and four in the second. Each course carries 3 semester hours of credit. Students majoring in Political Science should consult with their advisers before registering for this work.

The following faculty will staff the courses in this program:

Franz Michael, *Professor of International Affairs and Far Eastern History*
Andrew Gyorgy, *Professor of International Affairs and Political Science*
Harold C. Hinton, *Professor of Political Science and International Affairs*
Vladimir Petrov, *Professor of International Affairs*
Charles F. Elliott, *Associate Professor of Political Science and International Affairs*
William R. Johnson, *Associate Professor of History*
Richard C. Thornton, *Associate Professor of History*

FIRST SESSION—JUNE 11 TO JULY 18

HISTORY

Thornton

138A **History of World Communism** (3)
The international communist movement from its beginnings to the present. MTWThF 1:10–2:30 pm.

Petrov

206A **Seminar: Modern History of Eastern Europe** (3)
East Central and Southeastern Europe from the mid-1930's to the communist takeover (1948). MWF 6:10–8 pm.

Petrov

237A **Seminar: Soviet Foreign Policy, 1917–1953** (3)
Revolutionary concept of diplomacy. Parallel instruments of foreign policy during the era of "capitalist encirclement," 1917–1939. From Nazi-Soviet partnership to the alliance with the West. Foreign policies of the cold war. TTh 6–8:40 pm.

Thornton

387A **Readings in the History of Sino-Soviet Relations** (3)
1917 to the present. MWF 6:10–8 pm.

POLITICAL SCIENCE

Michael

101A **Far East in the Modern World** (3)
General character of Far Eastern societies and their response to the impact of America, Europe, and Russia; American policy in Far East and influence of world communism. MTWThF 8:10–9:30 am.

Elliott

160A **Modern Communist Ideologies** (3)
Intensive study of modern communism; emphasis on its antecedents and possible evolution. Careers and ideas of leading figures: Marx, Lenin, Stalin, Khrushchev, and Mao. MTWThF 4:10–5:30 pm.

163A **Soviet Foreign Policy** (3) Elliott

Relations with United States, Third World, China; international communism; instruments of foreign policy; interrelationships of domestic and foreign policies; ideology and foreign policy. MTWTh 5:45–7:25 pm.

*194A **Governments of China and Japan** (3) Michael

Institutions and processes of government in contemporary China and Japan, with some historical background. Attention to ideological forces. MTWThF 9:40–11 am.

COND SESSION—JULY 19 TO AUGUST 24

STORY

187B **History of Modern China** (3) Johnson

China since 1840, particular attention to political developments. MT WThF 1:10–2:30 pm.

396B **Readings in Modern Far Eastern History** (3) Johnson

MWF 6:10–8 pm.

LITICAL SCIENCE

†115B **Government and Politics in Eastern Europe** (3) Gyorgy

Study of the contemporary social and ethnic structures, governmental systems, and international position of the Eastern European states within the Soviet system. MTWThF 2:40–4 pm.

193B **Governments and Politics of South and Southeast Asia** (3) Hinton

Domestic and international politics of the major states in the area. MTWThF 11:10 am–12:30 pm.

For courses in Beginning Intensive Mandarin Chinese and Intensive Beginning Russian, consult departmental listings under East Asian Languages and Literatures and Slavic Languages and Literatures.

Secondary School Honors Program

OUTSTANDING SECONDARY SCHOOL STUDENT who wishes to enrich his academic background and participate in a stimulating introduction to college work ncouraged to seek admission to George Washington University's Secondary ool Honors Program. The Honors Student is enrolled in regular college ses appropriate to his level of study, his background, and his aptitude as rmined through consultation with his high school counselors and advisers e University.

e 162 and 194 are related in their subject matter, and credit for only one may be applied f a degree.

e 112, 115, and former P Sc 161 are related in their subject matter, and credit for only one three may be applied toward a degree.

Since dormitory life is a vital part of the stimulating academic and cultu atmosphere of the campus and community, Honors Students are allowed live in Thurston Hall, a modern, air-conditioned residence dormitory. Studer from the immediate metropolitan area may commute, but they are encourag to reside in the dormitory. Honors Students living in the dormitory are supe vised by well-trained resident counselors. A varied extracurricular progra focusing upon the unique location of the University in the nation's capital h been planned to complement both the academic and social life of the campu

Credit earned in the Program is applicable toward a degree at George Was ington University should the student later matriculate here. The transfer credit elsewhere depends upon the policies of the individual school to whic the student might later apply.

All students admitted to the Program are appointed Scholars in the Secon ary School Honors Program and receive scholarships for a five-week sessio Resident students pay only $445, covering full tuition, board, and room. Con muting students receive an $89.50 scholarship for each 3- or 4-hour cours Laboratory fees and cost of books are not included in these scholarships. Th Program is designed to include a normal summer session of two courses.

Since the Honors Program is limited to 80 secondary school students, ad mission is competitive. A transcript of the applicant's grades to date, availabl test scores, and evidence of emotional and intellectual maturity are criteria fo admission.

Application forms and further information may be obtained from Mrs. Jea G. Wuckovich, Director of the Secondary School Honors Program, Division o University Students, George Washington University, Washington, D.C. 2000

No applications will be considered after May 15.

Consult the *Undergraduate and Graduate Catalogue* for fall–spring concur rent program.

Summer Institute in Israel

A SEVEN-WEEK PROGRAM—JULY–AUGUST

A SPECIAL PROGRAM IN ISRAEL involves the study of the role which the geog raphy, culture, and history of Israel have played in the growth and develop ment of Judaism, Christianity, and Islam. Special attention is given to the contributions of archeology, historical geography, and theology to the understanding of these religions. Field trips provide opportunity for study on historical sites. Instructors are Professor Robert G. Jones and Assistant Pro fessorial Lecturer Martin S. Halpern.

Additional information, including costs of travel and tuition, may be ob tained from Professor Robert G. Jones, Chairman, Department of Religion, George Washington University, Washington, D.C. 20006.

RELIGION

137A **The Land of Israel and the Growth of the Western Religions** (6) Jones, Halpern

Summer Institute in Speech Pathology and Audiology

UNE 18 TO JULY 19

THE SPEECH PATHOLOGY AND AUDIOLOGY section of the Department of Speech nd Drama is offering a five-week Institute which will consider specific com-unication problems of the school-age child. The Institute will be divided nto two courses of study in Speech Pathology and two in Audiology, running oncurrently. The content of these courses is designed, through lectures, dis-ussions, and demonstrations of current practices and procedures, to enhance e knowledge of professionals in the field of communication disorders. Each ourse will be supplemented with lectures and demonstrations by nationally nown authorities who will discuss a particular phase of the course content. student may earn up to 6 semester hours of graduate credit during this Insti-ute. He may elect to take all 6 hours in one discipline, or 3 in each. A pre-quisite of 3 semester hours in the clinical management of speech and/or lan-uage disorders is required of those registering for the Speech Pathology course ork, and 3 semester hours of basic principles and procedures in Audiology are quired of those registering for Sp&D 292A.

The following faculty will staff the courses in this program:

Lloyd S. Bowling, Sr., *Associate Professor of Speech and Hearing*
Joan R. Regnell, *Assistant Professor of Speech*
Joseph P. Fox, *Assistant Professor of Speech*
Diane M. Brewer, *Assistant Professor of Speech*

A descriptive brochure is available upon request from Lloyd S. Bowling, irector, Summer Institute in Speech Pathology and Audiology, Department of peech and Drama, George Washington University, Washington, D.C. 20006.

PEECH AND DRAMA

182A **Introduction to Audiology** (3) Bowling

Overview of the field of audiology to include a review of sound and its properties, anatomy and physiology of auditory system, and methods and procedures of pure tone and speech audiometry. Prerequisite: Sp&D 101, 171. MTWTh 2:50–4:30 pm.

277A **Advanced Clinical Procedures in Speech and Hearing** (3) Regnell

Language therapy for school children. Study of speech and language evaluation and therapy procedures in public schools based on modern linguistics concepts. Video-taped demonstrations. MTWTh 10:50 am–12:30 pm.

291A **Seminar: Speech Pathology** (3) Fox

A psycholinguistic model for speech and language disorders. Presentation of a psycholinguistic model of communication based on transformational generative grammar theory and its application to the study of normal and abnormal speech and language behavior in children. May be repeated for credit. MTWTh 9–10:40 am.

292A **Seminar: Audiology** (3) Brewer

Principles and methods underlying identification and assessment of audi-tory disorders commonly found in hearing-handicapped school children. Methods for speech and language development, speech reading, and audi-

tory training of school-age children. Video-taped demonstrations. May repeated for credit. MTWTh 1–2:40 pm.

Urban Ecology Workshop

FIRST SESSION—JUNE 11 TO JULY 18

THE ENVIRONMENTAL CRISIS in the Washington metropolitan area is the sub ject of this interdisciplinary workshop. Under the direction of faculty mem bers from various disciplines, the workshop is divided into teams which inves tigate local environmental issues.

The workshop is open to both graduate and undergraduate students wh attend three classroom sessions and two field trips each week. Students wishin to enroll for graduate credit will be required to do extra work and will nee the permission of both their academic dean and the instructor.

Additional information and application forms may be obtained by writing to Roderick French, Coordinator, Humanities Development Program, George Washington University, Washington, D.C. 20006.

EXPERIMENTAL HUMANITIES

196A **Urban Ecology Workshop** (3)

Legal, scientific, political, and ethical aspects of specific environmental issues in the Washington metropolitan area. MTW 9:40–11 am; ThF 9:40 am–12:30 pm.

Workshop in Interpreting United States Domestic Policy for the Secondary Classroom

JULY 9 TO JULY 20

THE ATTEMPT OF THE FEDERAL GOVERNMENT to provide services to citizens in three different areas of need at no financial loss is the subject of an 11-day workshop for teachers. Because the performance of the National Rail Pas senger Corporation (Amtrak) is being thoroughly assessed in the spring and summer of 1973, Amtrak is an ideal topic for a case study. Comparisons will be made between Amtrak and the Communication Satellite Corporation (Com sat) and the U.S. Postal Service. Representatives from the railroads, Amtrak, the National Association of Railroad Passengers, the Department of Trans portation, and the U.S. Congress will present factual information and points of view. Faculty members of several departments of the University will be available for lectures and consultation. Materials for later classroom use will be developed by each student through discussion and through preparation of a slide-tape presentation.

Both morning and afternoon sessions will be arranged, and a train trip is planned for Saturday, July 14. Audio-visual facilities will be available for eve ning use. The train trip, a cassette tape, and facilities for making slides will be provided each participant as part of the cost of tuition.

Additional information may be obtained from John G. Boswell, Associate Professor of Education, Department of Education, Building C, George Washington University, Washington, D.C. 20006.

EDUCATION

400B **Special Workshop in Education** (2 or 3) Boswell and Staff

Topic for summer 1973: the Changing Role of Government Interpreted for the Secondary Classroom. An examination of three semi-autonomous business corporations established by the federal government—the Communications Satellite Corporation (Comsat), U.S. Postal Service, and National Rail Passenger Corporation (Amtrak)—utilizing a case study of Amtrak. Emphasis on implications for the teacher of social studies. MTWThFS 9 am–4 pm, as arranged.

Workshop in United States Foreign Policy

ULY 2 TO JULY 20

HE FOREIGN POLICY OF THE UNITED STATES is the subject of a three-week orkshop for secondary school teachers in the social sciences. The session will ocus on an intensive study of the formulation and execution of U.S. foreign olicy, combining daily two-hour lecture-discussion periods with assignments tilizing the resources of the Department of State, congressional committees, epartment and agency staffs, the National Security Council, and other organiations, both public and private, concerned with foreign policy. Of special significance to the program will be critiques of U.S. foreign policy and comparave foreign policy problems provided by selected diplomatic officials from the ajor areas of the world.

Both morning and afternoon lecture-discussion sections will be offered, with e two groups combining for the utilization of outside resource personnel. udents enrolling in the course will be expected to complete a selected reading t before the first session of the class.

Additional information and application forms may be obtained by writing to alph E. Purcell, Professor of Political Science, Building C, Room 627, George ashington University, Washington, D.C. 20006.

OLITICAL SCIENCE

267 **Seminar: U.S. Foreign Policy** (3)

Research and selected reading as the basis for an analysis of the foreign policy of the United States, with particular reference to the decision-making process and the execution of policy. Enrollment limited to teachers. Section B—Lecture and discussion, MTWThF 9:30–11:30 am; Section C—Lecture and discussion, MTWThF 1:30–3:30 pm. Conferences and field work as arranged.

COURSES OF INSTRUCTION

EXPLANATION OF COURSE NUMBERS

COLLEGES AND SCHOOLS OTHER THAN ENGINEERING AND APPLIED SCIENCE

First-group courses.—Courses numbered from 1 to 100 are planned for students in the freshman and sophomore years. With the approval of the adviser and the Dean, they may also be taken by juniors and seniors. In certain instances, they may be taken by graduate students to make up undergraduate deficiencies or as prerequisite to advanced courses, but they may not be taken for graduate credit.

Second-group courses.—Courses numbered from 101 to 200 are planned for students in the junior and senior years. They may be taken for graduate credit only upon the approval of the dean and the instructor at the time of registration. Such approval is granted only with the provision that students must complete additional work in order to receive graduate credit.

Third-group courses.—Courses numbered from 201 to 300 (in the Graduate School of Arts and Sciences, the School of Government and Business Administration, and the School of Public and International Affairs), courses numbered 201 to 400 (in the School of Education) are planned primarily for graduate students. They are open, with the approval of the instructor, to qualified seniors; they are not open to other undergraduates.

Fourth-group courses.—Courses numbered 301 to 400 in the Graduate School of Arts and Sciences are limited to graduate students, but they are primarily for doctoral candidates. Courses numbered 301 to 400 in the School of Government and Business Administration are limited to doctoral students. In the School of Education fourth-group courses, numbered 401 to 500, are limited to graduate students with Master's degrees from accredited institutions.

SCHOOL OF ENGINEERING AND APPLIED SCIENCE

Courses numbered from 1 through 199 are planned for undergraduate credit, although certain courses may be taken for graduate credit when arrangements are approved in advance by the instructor and the Dean. Courses numbered 201 to 300 are planned for graduate credit and may in certain instances be taken by qualified undergraduate students. Courses numbered from 301 to 400 are primarily for doctoral students.

EMESTER HOURS OF CREDIT

he number of semester hours of credit given for the satisfactory completion f a course is in most cases indicated in parentheses after the name of the ourse.

EY TO ABBREVIATIONS

he following abbreviations are used in this catalogue for course designations.

Acct	Accounting
AmCv	American Civilization
Anth	Anthropology
Ap S	Applied Science
Art	Art
B Sc	Biological Sciences
B Ad	Business Administration
Chem	Chemistry
Clas	Classics
CS	Computer Science
Asia	East Asian Languages and Literatures
Econ	Economics
Educ	Education
EE	Electrical Engineering
E Ad	Engineering Administration
Engl	English
Hum	Experimental Humanities
ForS	Forensic Science
Fren	French
Geog	Geography and Regional Science
Geol	Geology
Germ	Germanic Languages and Literatures
HCA	Health Care Administration
Hist	History
Jour	Journalism
Mgt	Management Science
Math	Mathematics
ME	Mechanical Engineering
Mus	Music
OR	Operations Research
Phil	Philosophy
PE	Physical Education, Health, and Recreation
Phys	Physics
P Sc	Political Science
Psyc	Psychology
P Ad	Public Administration
Rel	Religion
Slav	Slavic Languages and Literatures
Soc	Sociology
Span	Spanish
S Ed	Special Education
Sp&D	Speech and Drama
Stat	Statistics
U&RP	Urban and Regional Planning

e Schedule of Classes for the Summer Sessions, which will be available in il at the Office of the Registrar, will contain information about room gnments and instructors for courses.
he University reserves the right to change or withdraw any of the following rses.

ounting

Mastro, *Chairman*

1–2 **Introductory Accounting** (3–3)

Basic understanding of accounting concepts, procedures, analyses, and reports; the accounting measurement and communication of significant economic and financial data. Prerequisite to Acct 2: Acct 1. Students who have received credit for Acct 115 cannot receive credit for Acct 1–2. First Session: Acct 1A—MTWTh 5:45–7:25 pm. Second Session: Acct 2B—MTWTh 7:35–9:15 pm.

111B **Financial Statement Analysis** (3)

Analysis and interpretation of financial statements for the guidance o management, directors, stockholders, and creditors. Prerequisite: Acc 1–2. Second Session: MTWTh 4:10–5:30 pm.

*115 **Survey of Financial Accounting** (3)

Development, presentation, and interpretation of financial accounting data necessary to the management process. Students who have received credit for Acct 1–2 cannot receive credit for Acct 115. First Session: Section A—MTWTh 5:45–7:25 pm. Second Session: Section C—MTWTh 5:45–7:25 pm.

193A **Business Budgeting** (3)

Principles and procedures in the development, installation, and operation of a system of budgetary control to aid management. Prerequisite: Acct 1–2. Students who have received credit for Acct 101 cannot receive credit for Acct 193. First Session: MTWTh 7:35–9:15 pm.

†215 **Survey of Managerial Accounting** (3)

Study of the nature, analysis, and interpretation of accounting reports, primarily from the management point of view. Prerequisite: Acct 1–2 or 115. Students who have received credit for Acct 101 cannot receive credit for Acct 215. Second Session: Section B—MWTh 6:10–8 pm.

282B **Accounting Information Systems** (3)

Development and application of accounting system theory, including analysis, design, and implementation. Integration of automatic data processing, accounting systems, and management information systems. Prerequisite: Acct 1–2 or 115. Second Session: MWTh 6:10–8 pm.

299A **Thesis Seminar** (3)

First Session: As arranged.

300A **Thesis Research** (3)

Second Session.

American Civilization

Administered by the American Studies Program, Bernard Mergen, *Director*

71–72 **Introduction to American Civilization** (3–3)

Themes and issues in American civilization since Colonial times, with emphasis on their contemporary importance. First Session: AmCv 71A; Second Session: AmCv 72B. MTWThF 11:10 am–12:30 pm.

179–80 **Proseminar in American Civilization** (3–3)

Coordinating course for seniors majoring in American Civilization. First Session: AmCv 179A; Second Session: AmCv 180B. MTWThF 1:10–2:30 pm.

* A special section of this course, Acct 115B, for students in the Navy Graduate Financial Management Program, will be offered June 4 to July 27; hours to be arranged.

† A special section of this course, Acct 215C, for students in the Navy Graduate Financial Management Program, will be offered July 30 to August 31; hours to be arranged.

195 **Independent Study** (3)

Open to limited number of American Civilization majors with approval of instructor. First Session: Section A; Second Session: Section B. As arranged.

271B **Seminar: Research and Teaching in American Civilization** (3)

Consideration of American studies as an area for research and teaching; introduction to bibliography. Required of candidates for the degree of Master of Arts in the field of American Civilization. Second Session: As arranged.

294A **Field Research in Historical Archeology** (3)

A 10-week course, June 17 to August 24, at St. Mary's City, Md. (See Field Research in Historical Archeology program, pages 36–37.)

295 **Independent Study** (arr.)

Limited to Master's candidates. Permission of instructor, in writing, required. First session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

AmCv 299A and 300A: both sessions.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

For information concerning the Field Research in Historical Archeology program, see pages 36–37.

thropology

L. Humphrey, Jr., *Chairman*

rtmental prerequisite: Anth 1-2 is prerequisite to all other courses in thropology except Anth 158 and 162. This prerequisite may be waived by ission of instructor.

1-2 **Introductory Anthropology** (3–3)

Anth 1: survey of man's origin, physical evolution, and culture history. Anth 2: survey of the world's cultures, illustrating the principles of cultural behavior. First Session: Anth 1A, MTWThF 11:10 am–12:30 pm. Second Session: Anth 2B, MTWThF 9:40–11 am.

155A **Primitive Religion** (3)

Conceptions of the supernatural in nonliterate societies. Examination of religious beliefs and practices. Emphasis on states of consciousness. First Session: MTWThF 2:40–4 pm.

161B **Language and Culture** (3)

Structure and semantics of systems of human communication; linguist change; social aspects of language. Second Session: MTWThF 1:1 2:30 pm.

170A **Cultures of the Caribbean** (3)

Study of the culture history and ways of life of the various cultural grou of the area up to the ethnographic present. First Session: MTWTh 11:10 am–12:30 pm.

171A **Native Peoples of North America** (3)

Comparative study of Indian groups representative of each of the cultur areas of the continent. First Session: MTWThF 1:10–2:30 pm.

174A **Far Eastern Communities** (3)

Study of social organizations, religions, economies, and problems of cu rent anthropological interest for cultures of the Far East, including Japa Korea, China, and India. First Session: MTWThF 9:40–11 am.

182B **New World Archeology** (3)

Survey of North American culture history from man's entry into th Americas during the Pleistocene period until the time of the first Euro pean contacts. Second Session: MTWTh 11:10 am–12:50 pm.

254A **Seminar: Folklore in America** (6)

A 3-week course, July 9–29: MTWThF 9 am–4 pm. (See American Folk lore Seminar at Wolf Trap Farm, pages 34–35.)

290A **Advanced Museum Research** (3)

Supervised individual research and/or field work at the Smithsonian Insti tution, arranged in consultation with the Smithsonian and the Department of Anthropology. Admission by permission of the Chairman of the De partment. May be repeated for credit. First Session: As arranged.

294A **Field Research in Historical Archeology** (3)

A 10-week course, June 17 to August 24, at St. Mary's City, Md. (See Field Research in Historical Archeology program, pages 36–37.)

295 **Research** (3)

May be repeated for credit. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

Anth 299A and 300A: both sessions.

For information concerning the American Folklore Seminar at Wolf Trap Farm and the Field Research in Historical Archeology program, see pages 34–35, 36–37.

Applied Science

See "Engineering and Applied Science."

S. Grubar, *Chairman*

RT HISTORY

31–32 **Survey of Western Art** (3–3)

Survey of the arts in the Western world from prehistoric to modern times. A foundation for further study in the history of art. First Session: Art 31A—MTWThF 1:10–2:30 pm. Second Session: Art 32B—MTW ThF 11:10 am–12:30 pm.

101A **Greek and Roman Architecture** (3)

First Session: MTWThF 9:40–11 am.

105A **Renaissance Art in Italy II** (3)

High Renaissance and Mannerism. First Session: MTWThF 11:10 am–12:30 pm.

108A **18th Century Art in Europe** (3)

Development of painting, sculpture, and architecture. First Session: MTWThF 8:10–9:30 am.

109A **19th Century Art in Europe** (3)

Painting and sculpture. First Session: MTWThF 9:40–11 am.

110B **Contemporary Art** (3)

Painting and sculpture in 20th century Europe. Second Session: MT WThF 9:40–11 am.

112A **Art of Egypt and the Ancient Orient** (3)

Study of the art of Mesopotamia, Anatolia, Egypt, and Persia. First Session: MTWThF 11:10 am–12:30 pm.

114A **Baroque Art in the North** (3)

Development of painting, sculpture, and architecture in the 16th and 17th centuries in Holland, Flanders, Spain, France, Germany, and England. First Session: MTWThF 9:40–11 am.

115B **Christian Iconography** (3)

Origins and development of Christian symbols and themes from early Christian to modern times. Second Session: MTWThF 11:10 am–12:30 pm.

119A **Pre-Romanesque Art in the North** (3)

The Carolingian and Merovingian periods. First Session: MTWThF 1:10–2:30 pm.

120B **Art of China and Japan** (3)

Architecture, painting, and sculpture of China, Korea, and Japan. Second Session: MTWThF 1:10–2:30 pm.

141 **Etruscan Art and Archeology** (6)

August 1–31. (See Art and Archeology Program in Italy, page 35.)

147B **Pre-Columbian Art** (3)

An introduction to pre-Columbian art in Mexico, Central America, a South America from its beginnings to the Spanish conquest. Examinati of architecture, sculpture, ceramics, and painting of the great civilizatio of the Olmec, Teotihuacan, Maya, Aztec, Chavín, Mochica, and Inca. Second Session: MTWTh 5:45–7:25 pm.

148B **19th Century American Painting** (3)

Second Session: MTWThF 1:10–2:30 pm.

*207B **Modern Architecture** (3)

Development of modern architecture and building technology in Euro and America from the late 19th century to the present. Second Se sion: MTWThF 9:40–11 am.

248 **Independent Research** (3)

For Master's degree candidates; open to limited number of qualified u dergraduates, with permission. Independent research arranged in consu tation with individual instructor and graduate adviser. May be repeate for credit. First Session: Section A; Second Session: Section B.

FINE ARTS

Unless otherwise indicated, Fine Arts courses taught in University studi carry no material or laboratory fees; students must purchase their ow materials. Laboratory and material fees for courses taught at the Corcora School of Art are stated in the course description and are payable at the Schoo

Courses designated CSA are taught at the Corcoran School of Art. All othe courses are taught in University studios.

Departmental prerequisite: Art 21–22 and 41–42 (students concentrating i photography substitute Art 23–24 for 41–42), or permission of Departmen Chairman, are prerequisite to all other studio courses in Art.

Fine Arts courses numbered 121 through 281 may be repeated for credit wit approval of Department.

21–22 **Design I: Basic** (3–3)

Fundamental studies of principles and elements of design. Art 21: stud of two-dimensional design. Art 22: three-dimensional studies. Firs Session: Art 21A (CSA)—MTWThF 1–4 pm; Art 21B—MTWThF 4:10 7:10 pm; Art 22A—MTWThF 9–12 am; Art 22B (CSA)—MTWTh 1–4 pm.

23 **Fundamentals of Photography** (3)

Fundamental techniques of photography; emphasis on creative expressio Laboratory fee, $25. First Session: Section A (CSA)—lecture, 12:30–1:30 pm; laboratory, MTW 1:30–6 pm. First Session: Section (CSA)—lecture, Th 12:30–1:30 pm; laboratory ThFS 8 am–12:30 pm First Session: Section C (CSA)—lecture, M 6–7 pm; laboratory, TWT 6–9:30 pm and M 7–9:30 pm. Second Session: Section D—lecture MW 12–1 pm; laboratory section M, MTW 8–12 am; laboratory section N MTW 1–5 pm.

* May be taken for undergraduate credit with the approval of the instructor.

41–42 **Drawing I** (3–3)

Concepts of drawing, traditional and contemporary; training in perception, analysis of form, use of media, and exercises in connoisseurship. First Session: Art 41A (CSA) and 42A (CSA)—MTWThF 9–12 am; Art 41B-1, 41B-2 (CSA), and 42B (CSA)—MTWThF 1–4 pm; Art 41C (CSA) and 42C (CSA)—MTWThF 6:30–9:30 pm. Material and model fee for Art 41B-1, $15.

51–52 **Ceramics I** (3–3)

Working with clay as an art form. Basic techniques of hand building and wheel throwing. Laboratory fee: Art 51, $45; Art 52, $45. First Session: Art 51A (CSA) and 52A (CSA)—MTWThF 1–4 pm; Art 51B (CSA) and 52B (CSA)—MTWThF 6:30–9:30 pm. Second Session: Art 51C—MTWThF 1–4 pm.

57A **Graphics I** (3)

Exploration of the methods of intaglio, relief, printing, and other composite processes. Material fee, $20. First Session: MTWThF 1–4 pm.

61A **Water Color** (3) CSA

Painting in transparent and opaque water color and in acrylic. Experimentation, figurative and landscape. First Session: MTWThF 9–12 am.

65–66 **Painting I** (3–3) CSA

Emphasis on personal expression with exposure to a variety of styles and attitudes. Use of acrylic and oil. First Session: Art 65A and 66A—MTWThF 9–12 am; Art 65B and 66B—MTWThF 6:30–9:30 pm.

81–82 **Sculpture I** (3–3) CSA

Three-dimensional design. Basic sculptural techniques; modeling, carving, and construction. Media include wood, clay, stone, plaster. Laboratory fee: Art 81, $20; Art 82, $20. First Session: Art 81A and 82A—MTWThF 9–12 am.

123A **Design II: Individual Problems** (3)

Emphasis on the individual student and the problems and materials that specifically interest him in any area of design. First Session: MTWThF 1–4 pm.

25–26 **Painting II** (3–3) CSA

Emphasis on personal expression; exposure to a variety of styles and attitudes. Materials and techniques subordinate to individual experimentation. Use of acrylic and oil. First Session: Art 125A and 126A—MTW ThF 1–4 pm; Art 125B and 126B—MTWThF 6:30–9:30 pm.

27–28 **Painting III** (3–3)

Exploration of problems in developing a personal visual imagery. First Session: Art 127A (CSA) and 128A (CSA)—MTWThF 1–4 pm; Art 127B (CSA) and 128B (CSA)—MTWThF 6:30–9:30 pm. Second Session: Art 127C—MTWThF 9–12 am; material and model fee for Art 127C, $12.

31–32 **Ceramics II** (3–3)

Development of techniques with emphasis on quality and creativity. Laboratory fee: Art 131, $45; Art 132, $45. First Session: Art 131A (CSA) and 132A (CSA)—MTWThF 1–4 pm; Art 131B (CSA) and

132B (CSA)—MTWThF 6:30–9:30 pm. Second Session: Art 131 MTWThF 9–12 am.

135A **Advanced Water Color** (3) CSA

Development of techniques of water color; concentration on special p ects. First Session: MTWThF 9–12 am.

137B **Workshop in Materials, Methods, and Techniques** (3)

Drawing in charcoal, crayon, and pen; painting and preparation of grou for tempera, encaustic, fresco buono, oil, watercolor, polymer, and m techniques; graphic techniques in woodcut, engraving, etching. Mate and model fee, $10. Second Session: MTWThF 1–4 pm.

143–44 **Serigraphy** (3–3)

Advanced problems in serigraphy; emphasis on its aesthetic possibili Prerequisite: Art 57–58. First Session: Art 143A—MTWThF 9 am; Art 144A—MTWThF 1–4 pm.

151–52 **Ceramics III** (3–3) CSA

Development of techniques with emphasis on quality and creativity. S dents mix own clay and glazes. Laboratory fee: Art 151, $45; Art 1 $45. First Session: Art 151A and 152A—MTWThF 1–4 pm; Art 15 and 152B—MTWThF 6:30–9:30 pm.

153B **Graphics II** (3)

Advanced relief, intaglio, and other composite processes. Prerequisi Art 57–58. Material fee, $20. Second Session: MTWThF 9–12 am.

157–58 **Graphics III** (3–3)

Exploration of combined techniques and mixed media. Prerequisite: A 153–54. First Session: Art 157A (CSA) and 158A (CSA)—MT ThF 9–12 am. Material fee: Art 157A, $20; Art 158A, $20. Seco Session: 157B—MTWThF 1–4 pm.

159–60 **Drawing II** (3–3) CSA

Development of drawing. Individual study, application and extensions drawing. First Session: Art 159A and 160A—MTWThF 6:30–9:3 pm.

163–64 **Design: Visual Communication** (3–3) CSA

Layouts and execution in client-presentation form of various graphic d sign projects—brochures, bookjackets, displays, title graphics for fil media, etc. First Session: Art 163A and Art 164A—MTWThF 6:30 9:30 pm.

179–80 **Sculpture II** (3–3) CSA

Concepts of sculpture; new materials and developments. Laboratory fee Art 179, $20; Art 180, $20. First Session: Art 179A and 180A—MT WThF 9–12 am.

181A **Intermediate Photography** (3)

Basic problems. Introduction to color photography with emphasis o creative expression. Prerequisite: Art 23–24 or permission of instructor Laboratory fee, $25. First Session: lecture MW 12–1 pm; laboratory section M, MTW 8–12 am; laboratory section N, MTW 1–5 pm.

189–90 **Sculpture III** (3–3) CSA

Advanced study concentrating on relevance of scale and media. Rela tionship of sculpture to the environment. Laboratory fee: Art 189, $20 Art 190, $20. First Session: Art 189A and 190A—MTWThF 9–12 am

205A **Advanced Photography** (3) CSA

Advanced problems in photography; emphasis on individual development. Prerequisite: Art 181–82 or permission of instructor. Laboratory fee, $25. First Session: lecture M 12:30–1:30 pm, laboratory MTW 8 am–12:30 pm.

206A **Photography: Special Projects** (3)

Laboratory fee, $25. First session: As arranged.

231A **Design III** (3)

New media and techniques in three-dimensional design. First Session: MTWThF 9–12 am.

251–52 **Ceramics IV** (3–3) CSA

Development of techniques with emphasis on quality and creativity. Students mix own clay and glazes. Laboratory fee: Art 251, $45; Art 252, $45. First Session: Art 251A and 252A—MTWThF 1–4 pm; Art 251B and 252B—MTWThF 6:30–9:30 pm.

253A **Ceramics V** (3) CSA

Laboratory fee, $45. First Session: As arranged.

265–66 **Painting IV** (3–3) CSA

Creative painting; students work on independent projects as well as assigned problems. First Session: Art 265A and 266A—MTWThF 1–4 pm; Art 265B and 266B—MTWThF 6:30–9:30 pm.

279–80 **Sculpture IV** (3–3) CSA

Laboratory fee: Art 279, $20; Art 280, $20. First Session: Art 279A and 280A—MTWThF 9–12 am.

281A **Sculpture V** (3) CSA

Laboratory fee, $20. First Session: MTWThF 9–12 am.

For information concerning the Art and Archeology Program in Italy, see page 35.

ological Sciences

. Desmond, *Chairman*

rtmental prerequisite: B Sc 11–12 or equivalent is prerequisite to all nd-group courses in Biology, Botany, and Zoology, except by permission he instructor.

3–4 **Introductory Biology for Nonscience Majors** (3–3)

Survey of biological principles; emphasis on man as a functional organism in his environment. Prerequisite to B Sc 4: B Sc 3. Material fee, $12 each session. First Session: B Sc 3A; Second Session: B Sc 4B. MTW 6–9 pm; Th 6–7 pm.

11–12 **Introductory Biology for Science Majors** (4–4)
Biological principles and problems designed to furnish a base for a vanced studies in biology and related sciences. Prerequisite to B Sc 12 B Sc 11. Material fee, $15 each session. First Session: B Sc 11A Second Session: B Sc 12B. MTWThF 9:40 am–1 pm.

104A **Comparative Vertebrate Anatomy** (4)
Evolution and comparative morphology of vertebrates, stressing recen forms. Material fee, $18. First Session: MTWThF 6–9:20 pm.

127A **Genetics** (4)
Introductory course. Basic aspects of transmission of genetic traits with particular reference to the chemical basis of heredity and gene action. Material fee, $15. First Session: MTWThF 9:40 am–1 pm.

163B **Human Physiology** (3)
(This course, together with B Sc 164, replaces former B Sc 163 (4))
Introduction to the function of organ systems of the human body. Second Session: MWF 6–9:20 pm; TTh 6–7 pm.

164B **Human Physiology Laboratory** (1)
(This course, together with B Sc 163, replaces former B Sc 163 (4))
Study of basic physiology laboratory techniques; emphasis on the experi- mental study of homeostatic mechanisms in humans. Prerequisite or con- current registration: B Sc 163. Material fee, $18. Second Session: TTh 7:10–9:20 pm.

171 **Undergraduate Research** (arr.)
Admission by permission of the staff member concerned. May be re- peated for credit. Material fee, $15. First Session: Section A; Second Session: Section B.

295 **Research** (arr.)
Investigation of special problems. May be repeated for credit. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)
B Sc 299A and 300A: both sessions.

398A **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general exam- ination. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

Business Administration

H.R. Page, *Chairman*

51A **Introduction to Business** (3)
Structure, activities, and problems of business enterprise; its contribution

to the individual and to society; careers in business. First Session: MT WThF 1:10–2:30 pm.

102B **Fundamentals of Management** (3)

Planning, organizing, directing, coordinating, and controlling activities of the administrative unit; evolution of management thinking. Second Session: MTWTh 5:45–7:25 pm.

105A **Personnel Management** (3)

The labor force and labor markets. Industrial personnel and manpower programs, organization and policy in personnel activities. First Session: MTWTh 4–5:40 pm.

107B **Collective Bargaining** (3)

American unionism and collective bargaining; economic, social, and public policy considerations. The negotiation and administration of collective bargaining agreements. Prerequisite: B Ad 105 or permission of instructor. Second Session: MTWTh 5:45–7:25 pm.

131B **Business Finance** (3)

Analyzing capital requirements and methods of acquiring funds; planning efficient use of capital. Asset management, financial analysis, sources of funds, capital budgeting, stockholder relationships. Prerequisite: Acct 1–2; Econ 1; Math 30, 31; Stat 51. Second Session: MTWThF 4:10–5:30 pm.

138A **Investment and Portfolio Management** (3)

Theory and principles of security analysis and portfolio management, including analysis of the national economy, industry, company, and security markets. Risk-reward and computer-aided analysis. Prerequisite: Acct 1–2, B Ad 131. First Session: MTWThF 1:10–2:30 pm.

141B **Basic Marketing Management** (3)

Marketing and marketing management, consumer and demand analysis, retailing, wholesaling. Emphasis on major decision areas and tools. Prerequisite: B Ad 102, Econ 1–2. Second Session: MTWThF 11:10 am–12:30 pm.

144B **International Marketing Management** (3)

Analysis of the international marketing position of the United States, channels for international marketing, international advertising media, legal aspects, foreign market surveys, development of policies. Second Session: MTWThF 1:10–2:30 pm.

151A **Commercial Law: Contracts, Sales, Agency, Bailments** (3)

First Session: MTWTh 7:35–9:15 pm.

161B **Manufacturing Production** (3)

Basic principles and methods of manufacturing production. Manufacturing facilities, plant and equipment. Illustrations selected from various process and fabrication industries. Second Session: MTWTh 4–5:40 pm.

199B **Individual Research** (3)

Assigned topics. Admission by permission of adviser. May be repeated once for credit. Second Session: As arranged.

225B **Seminar: Manufacturing Production** (3)

Production technology, including new processes, materials, products, equipment, and facilities. Implications of emerging technology in managing the production function. Prerequisite: B Ad 181 or permission of instructor. Second Session: MWF 6:10–8 pm.

231A **Financial Decision-making** (3)

Functions and objectives of financial management, asset management, problems of internal financial analysis, rate-of-return analysis, financial forecasting, problems of capital demand and supply. Prerequisite: Acct 115 or equivalent, B Ad 131. First Session: MWF 6:10–8 pm.

233A **International Business Finance** (3)

Analysis of problems in international business finance. Impact of the evolving international payments system on business. Prerequisite: B Ad 131 or equivalent. First Session: MWF 1:10–3 pm.

237A **Investment Analysis** (3)

Risk-reward analysis of security investments including analysis of national economy, industry, company, and market; introduction to portfolio management; emphasis on theory and computer methods. Prerequisite: B Ad 131. First Session: MWF 6:10–8 pm.

241A **Marketing Management** (3)

Marketing management problems; market segmentation, product planning, channels of distribution, advertising, personal selling, sales promotion, pricing and development of integrated marketing programs. First Session: MWF 4:10–6 pm.

255A **International Business in Perspective** (3)
(Formerly International Trade)

The nature and order of magnitude of international business; global patterns of trade and investment; international and national institutions; policy issues, trends. First Session: MWF 6:10–8 pm.

257B **Operation of the Multinational Firm** (3)

International market entry and expansion; operating policies, procedures, and problems of multinational companies; developing executives for international business. Prerequisite: advanced Master's degree standing. Second Session: MWF 6:10–8 pm.

259A **Comparative Business Management** (3)

Primarily for doctoral students. Comparative analysis of business practices and management in different countries and economic systems. Generic characteristics of management and of business enterprises and how these are modified in different environments. Influence on the level of economic development, social structure, history, and culture of a country. Prerequisite: Mgt 201 or equivalent. First Session: MWF 6:10–8 pm.

260A **Economics for Management** (3)

For students in the Navy Graduate Financial Management Program only. Economic theory and its application in managerial decision-making; price theory, income and employment theory, related topics. Review of economic methodology. June 4 to July 27: As arranged.

265A **Seminar: Managerial Economics** (3)

Primarily for doctoral students. Special topics and applications of analytical tools to business decision-making and policy. Prerequisite: B Ad 261, 262; or permission of instructor. First Session: TTh 6:10–9 pm.

279B **Purchasing and Materials Management** (3)

Industrial purchasing and materials management principles and practices. Organization and functions in materials management. Determination of requirements, source selection, buying practices, policies, and ethics. Second Session: TTh 3:10–6 pm.

282A **Government Contract Administration** (3)

Surveillance over contractor performance of contract. Rights and obligations: changes, suspension of work, default, convenience termination, inspection, warranties, procedures for the settlement of controversies on government contracts. Prerequisite: B Ad 280 or permission of instructor. First Session: MWF 2:10–4 pm.

284A **Procurement Data Management** (3)

Technical data and the procurement process; contract-controlling documentation, patent rights, rights in data, requirements determination and the acquisition of data, federal policies, contractor interests. Configuration management; control of changes. Prerequisite: B Ad 280 or permission of instructor. First Session: MWF 4:10–6 pm.

291B **Seminar: Business Management** (3)

Primarily for doctoral students. Research on various phases of management as practiced in American industry. Second Session: MWF 4:10–6 pm.

298 **Readings in Business** (3)

Supervised readings in selected fields within business administration. Admission by permission of instructor. May be repeated once for credit. First Session: B Ad 298A; Second Session: B Ad 298B. MWF 8:10–10 pm.

299A **Thesis Seminar** (3)

Examination of thesis standards, research philosophy and methodology. First Session: As arranged.

300A **Thesis Research** (3)

Second Session.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Business Administration general examination. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Business Administration candidates. May be repeated for credit. Both sessions.

Chemistry

C.R. Naeser, *Chairman*

11–12 **General Chemistry** (4–4)

Elementary course in general chemistry, including qualitative analysis. Prerequisite to Chem 11: one year of high school algebra. Prerequisite to Chem 12: Chem 11. Laboratory fee, $21 each session. First Session: Chem 11A; Second Session: Chem 12B. MWF 8:10 am–1 pm; TTh 8:10–11:10 am.

110B **Introduction to Physical Chemistry** (3)

Topics include chemical thermodynamics, chemical kinetics, electrochemistry, solution chemistry, membrane and phase equilibria, and others. Prerequisite: Chem 16 or 22, Math 31, Phys 2; or permission of instructor. Not open to chemistry majors. May not be taken for credit by students who have received credit for Chem 111–12 or an equivalent course. A 6-week course, July 19 to August 31: MTWThF 6–7 pm.

151–52 **Organic Chemistry** (3–3)
(Formerly Chem 51–52)

Chemistry of the compounds of carbon. Prerequisite to Chem 151: Chem 12 or 16. Prerequisite to Chem 152: Chem 151. First Session: Chem 151A; Second Session: Chem 152B. MTWThF 8:10–9:40 am.

153–54 **Organic Chemistry Laboratory** (1–1)
(Formerly Chem 53–54)

Laboratory complement of Chem 151–52. Prerequisite or concurrent registration: Chem 151–52. Prerequisite to Chem 154: Chem 153. Laboratory fee, $21 each session. First Session: Chem 153A; Second Session: Chem 154B. MWF 9:50 am–1 pm.

295 **Research** (arr.)

Research on problems approved by the staff. Open to qualified students with advanced training. May be repeated for credit not to exceed a total of 8 semester hours. Laboratory fee, $10.50 a semester hour. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

Chem 299A—both sessions; laboratory fee, $18 each session. Chem 300A—both sessions; laboratory fee, $18 each session.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy cumulative examinations. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

Chinese

See "East Asian Languages and Literatures."

Classics

John E. Ziolkowski, *Chairman*

COURSES IN ENGLISH TRANSLATION

64A **Greek and Latin Origins of English Words** (3)

Study of Greek and Latin roots in English to improve vocabulary and facilitate understanding of the language of science, philosophy, politics, etc. Survey of the historical contact between Latin and English. First Session: MTWThF 1:10–2:30 pm.

105A **Survey of Classical Humanities** (3)

Representative masterpieces of Greek and Roman literature: epic, lyric, dramatic, philosophical, and historical. Students who receive credit for Clas 71 or 72 cannot receive credit for Clas 105. First Session: MTW ThF 9:40–11 am.

108A **Classical Mythology** (3)

Mythology of the Greeks and Romans from the creation of the world: tales of the gods, heroes, and great families that have influenced literature, art, and music. First Session: MTWThF 11:10 am–12:30 pm.

Computer Science

See "Engineering and Applied Science."

East Asian Languages and Literatures

Chung-wen Shih, *Acting Chairman*

CHINESE

7–8 **Beginning Intensive Mandarin Chinese** (6–6)

Intensive beginners' course in fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Asia 8: Asia 7. Laboratory fee, $17.50 each session. June 11 to July 13: Asia 7A*; July 16 to August 17: Asia 8B. Classroom—MTWThF 9–11:45 am, tutorial—MTWThF 12:45–1:35 pm, laboratory—MTWThF 1:45–2:35 pm.

*Students may register for Asia 8B on June 11.

209A **Child Development** (3)

Interdisciplinary approach to child development. Analysis, interpretation, and practical implications for instruction of research in disciplines contributing to a knowledge of child development. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 10:10–12 am; conference 9:10–10 am.

219A **Elementary School Classroom Procedures** (3)

Current theories of teaching and learning and their application to teaching acts and strategies of elementary school teachers. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 10:10–12 am; conference 9:10–10 am.

245A **School and Community** (3)

The school as an important member of a team of social agencies that builds the community. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 10:10–12 am; conference 9:10–10 am.

251A **Foundations of Guidance and Personnel Services** (3)

Introductory survey: definitions, scope, principles, historical background, organization, services, emerging trends, and issues. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 8:10–10 am; conference 10:10–11 am.

255A **Secondary Education** (3)

Current proposals for improvement of secondary education. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 10:10–12 am; conference 9:10–10 am.

257A **Educational and Occupational Development** (3)

Theories of career development; factors influencing the world of work; procedures for evaluating and using socio-personal, educational, and occupational information. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 10:10–12 am; conference 9:10–10 am.

260A **Secondary School Supervision** (3)

For experienced teachers and administrators. Review of modern supervisory concepts including practices in schools. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 10:10–12 am; conference 9:10–10 am.

316A **Curriculum Developments in Elementary School Social Studies** (3)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school social studies curriculum. Admission by permission of instructor. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 8:10–10 am; conference 10:10–11 am.

373A **The Junior-Community College** (3)

The two-year college as it relates to secondary education, four-year colleges, and universities. Objectives, curricula, students, faculty, legal concerns, and special problems of two-year colleges. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 10:10–12 am; conference 9:10–10 am.

380A **Sensitivity Training: Laboratory Method** (3)

A sensitivity learning experience in human relations using unstructured

group experience, individual feedback, experimentation, and practice. Admission by permission of Department, prior to registration. June 11 to 22: lecture and laboratory 9:10–12 am and 1:10–5 pm. June 25 to 29: individual projects as assigned and conference.

syc 22A **Introduction to Educational Psychology** (3)

The contributions of psychology to education, with special emphasis on learning. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 10:10–12 am; conference 9:10–10 am.

ECOND 3-WEEK WORKSHOP SESSION—JULY 2 TO JULY 20

lasses meet Monday through Friday. Concurrent registration for another daye course is not permitted, because each workshop course requires the full ay—lecture and conference in the morning; small group discussion and field ork in the afternoon.

*115B **Elementary School Teaching of Reading** (3)

Introduction to methods, techniques, materials, and activities essential to a good elementary school reading program. Prerequisite: Educ 108 and 123, or teaching experience. Lecture 8:10–10 am; conference 10:10–11 am.

201B **Seminar: International Education** (3)

For elementary school teachers. Survey of selected foreign educational systems and cultures. Research, techniques, and materials to develop world-mindedness. Embassy resources utilized. Lecture 9:10–11 am; conference 11:10–12 am.

223B **Foundations of Reading Instruction** (3)

Historical and psychological background; evaluation of recent methods, materials, and techniques in teaching reading; demonstrations of diagnostic and teaching techniques. Lecture 10:10–12 am; conference 9:10–10 am.

243B **Human Relations in Education** (3)

Principles and practices in human relations between and among learner, teacher, other school personnel, and parents. Lecture 10:10–12 am; conference 9:10–10 am.

253B **Analysis of the Individual for Purposes of Counseling** (3)

Detailed study of individual analysis and appraisal techniques. Development of systematic case study. Prerequisite: Educ 112 or equivalent. Lecture 10:10–12 am; conference 9:10–10 am.

256B **Secondary Education** (3)

Current problems in each subject-matter field. Lecture 8:10–10 am; conference 10:10–11 am.

285B **Student Activities** (3)

Nature and purposes of selected activities—homeroom, clubs, assemblies, school publications, student council, interscholastic contest; attention to sponsorship, participation, finance, and evaluation. Lecture 10:10–12 am; conference 9:10–10 am.

is course may not be taken by students who have completed or plan to enroll in Educ 111.

317B **Curriculum Developments in Elementary School Science** (3)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school science curriculum. Admission by permission of instructor. Lecture 8:10–10 am; conference 10:10–11 am.

341B **Cognitive Models and Instructions** (3)

Cognitive models (Guilford, Piaget, etc.) are analyzed as the theoretical basis for planning instructional episodes appropriate at various levels—childhood through young adulthood. Lecture 10:10–12 am; conference 9:10–10 am.

354B **Counseling of Minority Groups** (3)

Consideration of problems and approaches related to counseling cultural and racial minorities in American society; emphasis on counseling the disadvantaged in urban areas. Lecture 10:10–12 am; conference 9:10–10 am.

375B **Foundations of a College Student Development Program** (3)

College student development as an integral part of higher education programs. Lecture 9:10–12 am.

400B **Special Workshop in Education** (2 or 3)

July 9-20, MTWThFS 9 am–4 pm, as arranged. (See Workshop in Interpreting United States Domestic Policy for the Secondary Classroom, pages 42–43.)

P Sc 267 **Seminar: U.S. Foreign Policy** (3)

Enrollment limited to teachers. Section B—lecture and discussion 9:30–11:30 am; Section C—lecture and discussion 1:30–3:30 pm. Conferences and field work as arranged. (See Workshop in United States Foreign Policy, page 43.)

SIX-WEEK SESSION—JULY 2 TO AUGUST 10

112B **Educational Measurement** (3)

This special section of Educ 112 is limited to students in the M.A.T. program. Scope, needs, services to students, selection and construction of teacher-made tests, interpretation of tests for evidence purposes. Prerequisite: Educ 108 and 123. As arranged.

123B **Society and the School** (3)

Historical and social development of education, contemporary issues, cooperation of the school with other community agencies, functions of school personnel. TTh 6:40–9 pm; conference 6–6:40 pm.

152B **Early Childhood Curriculum** (3)

Admission by permission of instructor. TTh 6:40–9 pm; conference 6–6:40 pm.

220B **Elementary School Teaching Foundations** (9)

Limited to M.A.T. students. Introductory block course dealing with the content of professional education courses: history and philosophy of education; educational psychology; human development, learning, and teaching; society and the school; elementary school organization. 160 class

hours supplemented by field experience. MTWThF 9–12 am and 1–4 pm.

229B **Administration of Elementary Education** (3)

For experienced teachers and administrators. Achieving instructional objectives, organizing and servicing teaching activities, coordinating school and community life. TTh 4:10–6 pm; two conference hours as arranged.

233B **Audio-visual Education** (3)

Selection, evaluation, and use of audio-visual materials; administrative problems in care, operation, maintenance, and use of such materials and equipment. Material fee, $7. MW 6:40–9 pm; two conference hours as arranged.

271B **The Teacher and School Administration** (3)

Role of federal, state, and local administrative units; school finance; legal controls; school plant; public support; improving teaching conditions. TTh 6:40–9 pm; two conference hours as arranged.

278B **School Law** (3)

Sources and scope of school law; legal rights and responsibilities of teachers, pupils, and taxpayers. Other legal problems of major interest to the group. MW 6:40–9 pm; two conference hours as arranged.

293–94 **Research and Independent Study** (3–3)

Individual research under guidance of a staff member. Program and conferences arranged with an instructor. Educ 293B and 294B.

295 **Research Methods and Procedures** (3)

Required of all candidates for graduate degrees in Education. To be taken early in the graduate program. Section B: TTh 1:10–3:30 pm; two conference hours as arranged. Section C: MW 6:40–9 pm; two conference hours as arranged. Section D: TTh 6:40–9 pm; two conference hours as arranged.

296B **Seminar: Educational Research** (3)

Analysis of scientific approaches to problems in education and evaluation of the application of research techniques. Required of all candidates for the Ed.D. degree. Prerequisite: Educ 295 and Stat 105; or equivalent. MW 6:40–9 pm; two conference hours as arranged.

9–300 **Thesis Research** (3–3)

Required of Master of Arts in Education candidates writing Master's theses. Educ 299A and 300A.

332B **Early Childhood Curriculum** (3)

Content; approaches; methods and materials in language arts, mathematics, science, health, social studies, and creative arts. TTh 6:40–9 pm; conference 6–6:40 pm.

383B **Counseling of Adults** (3)

Theories and practical applications of occupational counseling, emphasizing distinct needs of adults and young adults; primarily intended for counselors in military, government, business, and industrial organizations. MW 6:40–9 pm; two conference hours as arranged.

385B **Collective Negotiations in Higher Education** (3)

Theory, practice, problems, and issues in collective negotiations in higher education. TTh 6:40–9 pm; two conference hours as arranged.

388B **Case Studies in Higher Education Administration** (3)

Analysis of selected hypothetical cases related to essential administrative functions of colleges and universities. Limited to advanced doctoral candidates. Admission by permission of instructor. MW 6:40–9 pm; two conference hours as arranged.

490B **Dissertation Seminar** (3)

Required of all Ed.D. degree candidates. Approval of the dissertation prospectus is necessary for successful completion of the seminar. MW 6:40–9 pm; two conference hours as arranged.

THIRD 3-WEEK WORKSHOP SESSION—JULY 23 TO AUGUST 10

Classes meet Monday through Friday. Concurrent registration for another daytime course is not permitted, because each workshop course requires the full day—lecture and conference in the morning; small group discussion and field work or laboratory in the afternoon.

128C **Children's Literature** (3)

Newer books for children and the children's classics, contribution of literature to child development, children's original expressions. Lecture 8:10–10 am; conference 10:10–11 am.

202C **Seminar: International Education** (3)

For elementary school teachers. Survey of selected foreign educational systems and cultures. Research, techniques, and materials to develop world-mindedness. Embassy resources utilized. Lecture 9:10–11 am; conference 11:10–12 am.

208C **Human Development** (3)

Contribution of various disciplines to an understanding of human development throughout the life span; emphasis on practical implications of relevant research. Lecture 10:10–12 am; conference 9:10–10 am.

231C **Secondary School Classroom Procedures** (3)

Current classroom practices: teacher-pupil planning, group procedures, initiatory and culminating activities, individual and group evaluation techniques, teaching aids, etc.; review of recent literature. Lecture 8:10–10 am; conference 10:10–11 am.

258C **Techniques of Counseling** (3)

Theories and practices of vocational, educational, and personal counseling. Prerequisite: 12 semester hours in guidance and counseling, including Educ 253 and 257. Lecture 10:10–12 am; conference 9:10–10 am.

272C **The Teacher and School Supervision** (3)

Nature, organization, human relationships, and techniques. Lecture 10:10–12 am; conference 9:10–10 am.

320C **Curriculum Developments in Elementary School Mathematics** (3)

For experienced educational personnel. Research, techniques, materials,

and innovative programs relating to the effective elementary school mathematics curriculum. Admission by permission of instructor. Lecture 8:10–10 am; conference 10:10–11 am.

342C **Language Development** (3)

Nature of language development; role of language in the socialization process. Lecture 10:10–12 am; conference 9:10–10 am.

357C **Mental Hygiene** (3)

Mental health problems; emphasis on needs of counselors, teachers, and others working with children and adolescents. Lecture 10:10–12 am; conference 9:10–10 am.

376C **College Student Development and Campus Groups** (3)

Principles and procedures of student development programs with campus groups; campus group activities and development of student leadership. Lecture 9:10–12 am.

For information concerning special programs and workshops of interest to teachers, see pages 34–43.

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PLIED SCIENCE

S 59 and 113 are administered by the Department of Civil, Mechanical, and ironmental Engineering, A.M. Freudenthal, *Chairman.*

S 114 is administered by the Department of Electrical Engineering and Comr Science, W.K. Kahn, *Chairman.*

S 115 is administered by the Department of Operations Research, W.H. low, *Chairman.*

59A **Introductory Analytical Mechanics** (4)

Kinematics, statics, and dynamics of a particle, statics and dynamics of systems of particles, kinematics of a rigid body, geometrical and inertial parameters of rigid bodies, statics and dynamics of rigid bodies and

beams. Introduction to Lagrangian-Hamiltonian formulation. Prerequisite: Ap S 113, Phys 31. First Session: MTWThF 4:10–5:50 pm.

113A **Engineering Analysis I** (3)

Analytical methods appropriate to the solution of engineering problems. Mathematical topics include matrices and linear algebra; ordinary differential equations, vector calculus, and integral theorems; complex algebra. Prerequisite: Math 32. First Session: MWF 6:10–8:25 pm.

114A **Engineering Analysis II** (3)

Analytical methods appropriate to the solution of engineering problems. Mathematical topics include Bessel functions, Legendre polynomials, Fourier series and integrals, Laplace transform, partial differential equations and boundary value problems. Prerequisite: Ap S 113. A 7-week course—June 11 to July 30: MW 6:10–8:40 pm.

115A **Probabilistic and Statistical Methods in Engineering** (3)

Solution of engineering problems using sets and functions; probability models; distributions and functions; statistical concepts and methods, including hypothesis testing, correlation, and regression. Prerequisite: Math 32. First Session: TTh 6:10–8:40 pm.

COMPUTER SCIENCE

Administered by the Department of Electrical Engineering and Computer Science, W.K. Kahn, *Chairman*.

SEVEN-WEEK COURSES—JUNE 11 TO JULY 30

298A **Research** (arr.)

Research as arranged. May be repeated for credit.

299–300 **Thesis Research** (3–3)

CS 299A and 300A.

399A **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit.

ELECTRICAL ENGINEERING

Administered by the Department of Electrical Engineering and Computer Science, W.K. Kahn, *Chairman*.

SEVEN-WEEK COURSES—JUNE 11 TO JULY 30

11A **Linear Networks I** (3)

Circuit concepts, elements, and parameters; network conventions and equations: mesh and node analysis; network solutions using differential equations and initial conditions; transient and steady-state response; impedance concepts; energy and power; resonance. Prerequisite: Ap S 113, Phys 32. TTh 3:10–5:40 pm.

51A **Applications of Computers** (3)

Solution of problems on digital computers, using machine language,

FORTRAN, data processing, and numerical methods. Writing, debugging, and running programs on a digital computer. MW 3:10–5:40 pm.

153A **Design of Switching Systems** (3)

Switching algebra and Boolean logic; analysis and design of switching devices; design of combinational and sequential logic networks; minimization techniques and their use in logic design; electronic implementation of logic; number systems and codes, geometric interpretation, error-correcting codes; encoding and decoding; logic and electronic design of functional digital units. Prerequisite: EE 152 or permission of instructor. May be taken for graduate credit. TTh 6:10–8:40 pm.

154A **Digital Computer Design** (3)

Logic and electronic design of functional digital units, design of computer subsystems, flow of information and logical flow diagrams in timing and control; design of memory, arithmetic, and I/0 units; binary and decimal machine arithmetic; design of a digital computer. Prerequisite or concurrent registration: EE 153 or permission of instructor. May be taken for graduate credit. TTh 3:10–5:40 pm.

157A **Machine and Assembly Language Programming** (3)

Machine and assembly language programming in fixed and variable word-length computers; techniques in addressing and machine control; data structures and data processing; use of subroutine linkages; co-routines, pushdown lists, list processing, loops and input-output subroutines; use of a macro-assembly language; sorting, merging, arrays, and data fields in data processing. Prerequisite: EE 152 or equivalent, or permission of instructor. May be taken for graduate credit. TTh 3:10–5:40 pm.

198A **Research** (1 to 3)

Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status.

204A **Stochastic Signals and Noise** (3)

Probability, random variables, characteristic functions; transformations of random variables and applications; sequences of random variables, linear mean squared estimation; stationary estimation; stationary random processes, correlation functions, power spectrum; output of linear systems with stochastic inputs; Gaussian processes. Applications drawn for communications, control theory, computer science. TTh 6:10–8:40 pm.

286A **Sensory Evoked Potentials** (3)

Physiological significance of the visual evoked potential, stimulation variables, subject variables, data acquisition procedures and instrumentation, signal-averaging computers, analysis techniques for the VEP, applications of the VEP. Prerequisite: EE 281, 282, 283, 284; or permission of instructor. MW 6:10–8:40 pm.

298A **Research** (arr.)

Research as arranged. May be repeated for credit.

300 **Thesis Research** (3–3)

EE 299A and 300A.

399A **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit.

ENGINEERING ADMINISTRATION

P.A. Crafton, *Chairman*

SEVEN-WEEK COURSES—JUNE 11 TO JULY 30

170A **Basic Quantitative Methods for Engineering Administration** (3)

An introductory treatment of quantitative tools and techniques important in administration; emphasis on their application. Concepts of probability and decision-making in administrative decisions. TTh 3:10–5:40 pm.

211A **Engineering Administration** (3)

Comprehensive and systematic study of the administrative process; emphasis on industrial, scientific, and engineering environments. Planning: objectives, prediction, policies, plans and characteristics of plans. Organizing: theory of organization, structure, authority, specialization, delegation, staff and committees. MW 3:10–5:40 pm.

*297A **Problems in Engineering Administration** (3)

Project course providing the student with the opportunity to apply the various concepts and tools previously studied to the solution of a problem in engineering administration. Students will work individually or in small groups, each on a problem proposed by the student and approved by the instructor. MW 3:10–5:40 pm.

MECHANICAL ENGINEERING

Administered by the Department of Civil, Mechanical, and Environmental Engineering, A.M. Freudenthal, *Chairman*.

131B **Thermodynamics** (3)

Fundamental thermodynamic concepts, Zeroth law of thermodynamics and temperature measurements, work and heat, first law of thermodynamics, properties of pure substances, first-law analysis of some thermodynamic systems, second law of thermodynamics, reversibility, entropy, second-law analysis of thermodynamic systems. Prerequisite or concurrent registration: Ap S 59. Second Session: MTTh 6:10–8:25 pm.

OPERATIONS RESEARCH

W.H. Marlow, *Chairman*

SEVEN-WEEK COURSES—JUNE 11 TO JULY 30

201A **Survey of Operations Research Methods I** (3)

Basic concepts and techniques of operations research as applied to problems in industrial, governmental, and military decision-making. Allocation models including the simplex procedure of linear programming, transportation and assignment models, queuing theory, inventory theory, game

* Students intending to register for E Ad 297 in the summer session 1973 should consult the Department Office during spring semester 1973 to obtain a course flyer outlining the course project requirements. This is advisable due to the abbreviated time period of the summer session.

theory, and decision-making under uncertainty. Prerequisite: Ap S 115 or equivalent. TTh 3:10–5:40 pm.

202A **Survey of Operations Research Methods II** (3)

Simulation, Monte Carlo techniques; networks; integer programming; introduction to nonlinear programming; dynamic programming; Markov chains; reliability and replacement. Prerequisite: OR 201 or equivalent. MW 3:10–5:40 pm.

nglish

P. Reesing, Jr., *Acting Chairman*

udents whose College Board English Composition Achievement Test scores ggest inadequate preparation may be assigned to Engl 1*x* or may be tested vocabulary, spelling, grammar, standard usage, and writing skill, before acement in either Engl 1*x* or 1. Students whose scores and/or writing skill dicate superior competence will be allowed to waive Engl 1; those whose ores indicate markedly superior competence will be allowed to waive both ngl 1 and Engl 2 or 4.

partmental prerequisite: Engl 1 or 1*x* is prerequisite to all other courses in glish. A 6-semester-hour course in literature, or equivalent, or written persion of the instructor, is prerequisite for admission to all second-group urses in English except Engl 115 and 161–62.

GLISH COMPOSITION

AB **English for Foreign Students** (3)

Reading and writing to assist the foreign student in overcoming deficiencies in the use of English. Special attention to spelling, syntax, grammar, idiom, and vocabulary. Second Session: MTWTh 5:45–7:25 pm.

BB **English for Foreign Students** (3)

For second-semester foreign students not ready for Engl 1. Writing of expository paragraphs and themes; outlining; reading for comprehension, vocabulary, and style. Second Session: MTWTh 7:35–9:15 pm.

1A **English Composition: Language as Communication** (3)

Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence, by analysis of selected current books; library research procedure. First Session: MTWThF 11:10 am–12:30 pm.

2B **English Composition: Language and the Arts and Sciences** (3)

Study and practice of expository and argumentative techniques; emphasis on the rhetorical complexities of the sentence and of diction, and on logical thought, by analysis of selected books on the nature of language and of the arts and sciences. Prerequisite: Engl 1 or 1*x*. Students who receive credit for Engl 2 cannot receive credit for Engl 4. Second Session: MTWThF 9:40–11 am.

4B **English Composition: Language in Literature** (3)
Study and practice of expository and argumentative techniques through critical writing; emphasis on the rhetorical complexities of stylistics in the sentence and in diction, and on logical thought, by the study of literary genres and of the use of language in literature. Prerequisite: Engl 1 or 1x. Students who receive credit for Engl 4 cannot receive credit for Engl 2. Second Session: MTWThF 11:10 am–12:30 pm.

ENGLISH LITERATURE

51–52 **Introduction to English Literature** (3–3)
Historical survey. First Session: Engl 51A; Second Session: Engl 52B. MTWTh 5:45–7:25 pm.

116B **Medieval Legend and Saga** (3)
Celtic and Norse. Second Session: MTWTh 5:45–7:25 pm.

128A **Shakespeare** (3)
First Session: MTWTh 5:45–7:25 pm.

129A **The Earlier 17th Century** (3)
Poetry and prose to 1660, exclusive of Milton. First Session: MTW ThF 4:10–5:30 pm.

151A **19th Century British Poetry** (3)
Readings in Wordsworth, Keats, Browning, and Swinburne. First Session: MTWThF 1:10–2:30 pm.

157A **20th Century Drama** (3)
Representative continental, English, and American plays of the 20th century. First Session: MTWThF 11:10 am–12:30 pm.

158B **20th Century British Prose Fiction** (3)
Second Session: MTWThF 11:10 am–12:30 pm.

AMERICAN LITERATURE

71–72 **Introduction to American Literature** (3–3)
Historical survey. Engl 71: from beginnings to the Civil War. Engl 72: from the Civil War to present. First Session: Engl 71A; Second Session: Engl 72B. MTWThF 9:40–11 am.

164A **Major American Poets** (3)
Advanced critical study of significant writers and movements in the 20th century. First Session: MTWTh 7:35–9:15 pm.

170B **The American Short Story** (3)
Historical development of the short story in America. Second Session: MTWThF 1:10–2:30 pm.

173–74 **Selected Literary Movements** (3–3)
Engl 173: the flowering of the Midwest—Midwestern literature and its cultural backgrounds, 1912–1964. Engl 174: literature of the 1930s—

the relationship between literature and ideology during a decade of social change. First Session: Engl 173A—MTWThF 9:40–11 am. Second Session: Engl 174B—MTWThF 4:10–5:30 pm.

175A **Special Topics in American Literature** (3)

Topic for summer: the novel of initiation. First Session: MTWThF 4:10–5:30 pm.

177A **Contemporary American Literature** (3)

First Session: MTWTh 5:45–7:25 pm.

268B **Seminar: American Fiction** (3)

Nathaniel Hawthorne and Henry James. Second Session: MWTh 6:10–8 pm.

xperimental Humanities

dministered by the Office of Program Development, C.C. Mondale, *Director*

101–2 **Supervised Work-Study** (3–3)

Community-based projects supervised by appropriate faculty. Juniors and seniors admitted by permission of instructor. Prerequisite to Hum 102: Hum 101. First Session: Hum 101A and 102A; Second Session: Hum 101B and 102B. As arranged.

196A **Urban Ecology Workshop** (3)

First Session: MTW 9:40–11 am; ThF 9:40 am–12:30 pm. (See Urban Ecology Workshop, page 42.)

rensic Science

. Perros, *Chairman*

226A **The Crime Lab, the Forensic Scientist, and the Criminal Lawyer** (3)

Same as Law 473(2). Qualifications and preparation of an expert witness and the relationships and responsibilities of the expert in court in criminal and civil cases. Prerequisite: ForS 224. Session, day, and hour of this course will be announced by the National Law Center.

295 **Research** (arr.)

Open to qualified Master's degree students. Research on problems approved by the departmental advisers. May be repeated for credit. First Session: Section A; Second Session: Section B.

–300 **Thesis Research** (3–3)

ForS 299A and 300A: both sessions.

nts registering for ForS 226 make special arrangements with the instructor for supplemen- signments equivalent to one additional semester hour.

French

Administered by the Department of Romance Languages and Literatures, J.F. Burks, *Chairman*

Placement Examination: A student who has not been granted advanced stand ing and who wishes to continue in college the language begun in high schoo must take a placement examination before registration. Upon completion o the examination, assignment is made to the appropriate course.

Departmental prerequisite: Fren 3–4 or 6, or equivalent, is required as pre requisite to all second-group courses in French.

1–2 **First-year French** (3–3)

A year course: credit toward a degree at this University given on com pletion of Fren 2. For beginners. Pronunciation, conversation, gramma composition, reading of modern French prose. Aural training, oral prac tice in language laboratory. Laboratory fee, $17.50 a session. Firs Session: Fren 1A; Second Session: Fren 2B. Classroom—MTWTh 9:40–11 am, laboratory—MTh 11:10–12 am.

3–4 **Second-year French** (3–3)

A year course: credit toward a degree at this University given on comple tion of Fren 4. Conversation, grammar, composition, reading in moder French prose, introduction to French civilization. Aural training, ora practice in language laboratory. Prerequisite: Fren 1–2, 2*x*, or two years of high school French. Laboratory fee, $17.50 a session. First Ses sion: Fren 3A; Second Session: Fren 4B. Classroom—MTWThF 11:1 am–12:30 pm, laboratory—MTh 10:10–11 am.

9–10 **French Conversation and Composition** (3–3) Firs

Prerequisite: Fren 4 or equivalent and permission of instructor. Session: Fren 9A; Second Session: Fren 10B. MTWThF 9:40–11 am.

49A **French for Graduate Students** (0)

For graduate students preparing for reading examinations. No academi credit. Tuition fee, $258. First Session: MTWThF 6–7:20 pm.

129A **Contemporary French Literature** (3) First Ses

Topic for summer: trends in 20th century French fiction. sion: MTWThF 4:10–5:30 pm.

Geography and Regional Science

M.F. Gordon, *Chairman*

51A **Introduction to Geography** (3)

General survey of the various systematic, physical, and human fields o geography which play a role in the analysis and interpretation of mar environment relationships in both spatial and ecological contexts. First Session: MTWThF 9:40–11 am.

52B **Introduction to Economic Geography** (3)
(Formerly World Regional Patterns)

Emphasis on spatial aspects of man's activities within a world regional framework. Second Session: MTWThF 9:40–11 am.

125A **Transportation Geography** (3)

Consideration of the spatial aspects of interaction, diffusion, and information transfer, including nodal activity and hierarchies, network geometry, gravity models, and diffusion processes. First Session: MTW ThF 9:40–11 am.

132A **Resources and Environment** (3)

Analysis of the spatial pattern of resources and the problems created by man's utilization of unevenly distributed resources. First Session: MT WThF 8:10–9:30 am.

140B **Urban Geography** (3)

Analysis of the internal spatial structure of cities; emphasis on explaining patterns of location within the city. Second Session: MTWThF 11:10–am–12:30 pm.

144A **Environmental Adaptation** (3)

Consideration of the man-environment relationship; emphasis on bioclimatological responses, disease ecology, nutritional demands, land capabilities, artificial environments, and environmental perception. First Session: MTWThF 11:10 am–12:30 pm.

146A **Political Geography** (3)

Analysis of the interrelationships between the political community and the human and physical environment. First Session: MTWThF 11:10 am–12:30 pm.

189–90 **Readings in Geography** (arr.)

First Session: Geog 189A and 190A; Second Session: Geog 189B and 190B.

295 **Research** (arr.)

May be repeated once for credit. First Session: Section A; Second Session: Section B.

9–300 **Thesis Research** (3–3)

Geog 299A and 300A: both sessions.

ology

a Teleki, *Chairman*

1–2 **Introductory Geology** (3–3)

Survey covering the principles of geology; emphasis on man's effect on the environment. Laboratory fee, $12 each session. First Session: Geol 1A; Second Session: Geol 2B. MTWTh 9:40 am–12:30 pm.

5B **Environmental Geology** (3)

The relation of man and society to natural environment; population evo lution and resources; economic, legal, and political aspects. Secon Session: TWTh 1:10–3:30 pm.

147A **Chemical Geology in the Earth and Ocean Sciences** (3)

Introduction to geochemical and chemical principles involved in geologica systems and their application to contemporary problems in oceanology pollution, and mineral exploration. Laboratory fee, $12. First Ses sion: MTWTh 9:40–12 am.

295 **Research** (arr.)

Research on problems approved by the Staff. Open to qualified student with advanced training. May be repeated for credit. First Session Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

First Session: Geol 299A; Second Session: Geol 300A.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general ex amination. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit Both sessions.

Germanic Languages and Literatures

Carl Steiner, *Chairman*

Placement Examination: A student who has not been granted advanced stand ing and who wishes to continue in college the language begun in high schoo must take a placement examination before registration. Upon completion o the examination, assignment is made to the appropriate course.

1–2 **First-year German** (3–3)

A year course: credit toward a degree at this University given on com pletion of Germ 2. Essentials of German grammar; reading of easy prose. Aural-oral practice in language laboratory. Laboratory fee, $17.5 each session. First Session: Germ 1A; Second Session: Germ 2B Classroom: MTWThF 6–7:20 pm. Laboratory: Section M—MTh 5–5:5 pm; Section N—MTh 7:30–8:20 pm.

3–4 **Second-year German** (3–3)

A year course: credit toward a degree at this University given on com pletion of Germ 4. Selections from modern German prose; continuatio and review of grammar. Aural-oral practice in language laboratory. Pre requisite: Germ 1–2 or equivalent. Laboratory fee, $17.50 each session First Session: Germ 3A; Second Session: Germ 4B. Classroom: MTW ThF 7:35–8:55 pm. Laboratory: Section M—MTh 5–5:50 pm; Sectio N—MTh 6:30–7:20 pm.

47A **Beginning German for Reading Examination Candidates** (0)

Specifically for graduate students with little or no German who are preparing for reading examinations. No academic credit. Tuition fee, $258. First Session: MTWTh 5:45–7:25 pm.

49B **German Readings for Nonmajor Students** (3)

Primarily for graduate students preparing for reading examinations, undergraduates admitted. No academic credit for graduate students. Prerequisite: Germ 4 or 47, or equivalent. Second Session: MTWTh 5:45–7:25 pm.

ealth Care Administration

on Gintzig, *Chairman*

210A **Advanced Financial Management of Health Care Institutions** (3)

Nature and interpretation of health care institution financial reports. Techniques of financial planning and control; operation of third-party reimbursement contracts; capital needs, planning, and acquisition; case studies, field research. Prerequisite: HCA 209. June 11 through August 24: T 3–5 pm.

215A **Practicum in Health Project Planning** (3)

Supervised practical instruction in agencies doing comprehensive health planning; emphasis on basic investigation and problem-solving techniques, including various methods of collecting, analyzing, and reporting data. Prerequisite: HCA 212. June 11 through August 24.

270A **Research in Health Care Administration** (3)

Field research. Primarily for doctoral students; open to other graduate students with consent of instructor. May be repeated for credit. June 11 through August 24.

285A **Readings in Health Care Administration** (3)

Supervised readings in some special areas or subdivisions of health care administration. Primarily for doctoral students; open to other students by arrangement. June 11 through August 24.

288A **Seminar: Field Problem Studies in Health Care Administration** (3)

Selected administrative issues and problems arising in health care facility situations. Primarily for doctoral students; open to other students by arrangement. May be repeated for credit. June 11 through August 24.

293 **Residency I** (3)

First third of the twelve-month residency, beginning June 1 or July 1. Work experience under a qualified preceptor, periodic written progress reports, and a written major report. Sections A, B, C, and D.

6A **Residency II** (3)

First third of twelve-month residency, beginning June 1 or July 1. For selected students who take a second year of residency.

History

C.J. Herber, *Chairman*

Departmental prerequisite: Hist 39–40 or 91–92 is prerequisite to courses 108 through 158 and 187 through 196; Hist 71–72, to courses 167 through 186; either Hist 39–40, 71–72, or 91–92, to courses 161 through 166. Prerequisite to Hist 105–6 is either Hist 39–40, 91–92, or a background in a science. Students may waive one or more of the prerequisite courses by passing a departmental waiver examination, by attaining scores of 600 or above on the College Entrance Examination Board Achievement Tests, or by good performance on Advanced Placement Examinations.

Prerequisite to all third-group and fourth-group History courses: the appropriate second-group preparation and consent of instructor. Fourth-group History courses are limited to graduate students; but they are primarily for doctoral candidates.

39–40 **European Civilization in Its World Context** (3–3)

Hist 39: political, social, economic, and cultural history to early modern era. Hist 40: from early modern era to present. Students who receive credit for Hist 39–40 cannot receive credit for Hist 91–92. First Session: Hist 39A; Second Session: Hist 40B. MTWThF 9:40–11 am.

71–72 **Introduction to American History** (3–3)

Hist 71: political, social, economic, and cultural forces of the United States in their world setting from 1492 to 1861. Hist 72: from 1861 to present. First Session: Hist 71A—MTWThF 11:10 am–12:30 pm; Hist 72A—MTWThF 1:10–2:30 pm. Second Session: Hist 71B—MTWThF 11:10 am–12:30 pm; Hist 72B—MTWThF 1:10–2:30 pm.

138A **History of World Communism** (3)

First Session: MTWThF 1:10–2:30 pm. (See Russian-East Asian Studies program, pages 38–39.)

142A **History of France** (3)

Political, social, and cultural development from Napoleon to present. First Session: MTWThF 9:40–11 am.

150B **European Diplomatic History** (3)

Emphasis on policies and actions of the great powers and their statesmen since 1890. Students who receive credit for Hist 150 cannot receive credit for Hist 157. Second Session: MTWThF 11:10 am–12:30 pm.

153A **Tudor England** (3)

Aspects of the constitutional, social, intellectual, and religious development of England, 1485–1603. First Session: MTWThF 11:10 am–12:30 pm.

158A **Modern Jewish History** (3)

A secular history of the Jewish people from the 18th century to the present state of Israel, with particular emphasis on European political, economic, and cultural influences. First Session: MTWThF 9:40–11 a

182A **U.S. Diplomatic History** (3)

Survey of American foreign relations in the 20th century. First Session: MTWThF 8:10–9:30 am.

187B **History of Modern China** (3)

Second Session: MTWThF 1:10–2:30 pm. (See Russian-East Asian Studies program, pages 38–39.)

203–4 **Research Seminar** (3–3)

Prerequisite: Departmental approval. First Session: Hist 203A; Second Session: Hist 204B. As arranged.

206A **Seminar: Modern History of Eastern Europe** (3)

First Session: MWF 6:10–8 pm. (See Russian-East Asian Studies program, pages 38–39.)

237A **Seminar: Soviet Foreign Policy, 1917–1953** (3)

First Session: TTh 6–8:40 pm. (See Russian-East Asian Studies program, pages 38–39.)

248A **Reading Seminar: Modern European and Near Eastern History** (3)

Admission by permission of instructor. First Session: As arranged.

278B **Research Seminar: American History** (3)

Admission by permission of instructor. Second Session: As arranged.

-300 **Thesis Research** (3–3)

Hist 299A and 300A: both sessions.

87A **Readings in the History of Sino-Soviet Relations** (3)

First Session: MWF 6:10–8 pm. (See Russian-East Asian Studies program, pages 38–39.)

96B **Readings in Modern Far Eastern History** (3)

Second Session: MWF 6:10–8 pm. (See Russian-East Asian Studies program, pages 38–39.)

8A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. Both sessions.

9A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

or information concerning the special program in Russian-East sian Studies, see pages 38–39.

te for Sino-Soviet Studies

rmation concerning the Russian-East Asian Studies program, see pages

Journalism

R.C. Willson, *Chairman*

72A **Introduction to Mass Communication** (3)

Mass media, problems of contemporary journalism, emphasis on medi
government relations. First Session: MTWThF 9:40–11 am.

111A **Reporting** (3)

Gathering, evaluating, and writing news. Laboratory fee, $5. Fir
Session: MTWThF 9:40–11 am.

150A **News Coverage in Washington** (3)

A survey of the way news is gathered and reported in the nation's cap
tal by wire services, newspaper bureaus, and the local dailies. Field trip
to major news centers; practice coverage. First Session: MTWTh
11:10 am–12:30 pm.

Law

A list of courses to be offered during the summer of 1973 at the National La
Center will be available in a Law Center announcement scheduled to be issue
during January 1973. Copies of this announcement may be obtained from th
National Law Center.

Management Science

E.K. Winslow, *Chairman*

118A **Introduction to Information Processing** (3)

(Formerly Introduction to Data Processing)

Basic principles and methods. A management-oriented introduction to t
fundamentals, potentials, and problems of computer-based data proces
ing as a tool for record-keeping, resource-controlling, and decision-ma
ing. First Session: MTWTh 4:10–5:50 pm.

*201 **Advanced Administrative Management** (3)

Principles and practices common to administrative units of all kinds.
First Session: Section A—MWF 4:10–6 pm; Section B—MWF 8:10–
pm. Second Session: Section C—MWF 6:10–8 pm.

203A **Mathematics for Management** (3)

Mathematical concepts employed in the solution of management pro
lems. Applications of analytical geometry, functions, elements of calcul
and linear algebra to optimization problems. Prerequisite: algebra.
First Session: MWF 4:10–6 pm.

* A special section of this course, Mgt 201D, for students in the Navy Graduate Financial Mana
ment Program, will be offered July 30 to August 31; hours to be arranged.

204 **Quantitative Factors in Administration** (3)

Survey of quantitative techniques used in the solution of management problems. Potentials and limitations of mathematical models and proper areas for their application. Topics include probability, statistical decision theory, linear programming, waiting line, inventory replacement models. First Session: Section A—MWF 10:10–12 am; Section B—TTh 5:10–8 pm. Second Session: Section C—MWF 8:10–10 pm.

207 **Human Behavior in Organizations** (3)

Individual, group, intergroup, and other human behavior and development; application of social science research to administration. Practical applications emphasized. First Session: Section A—MWF 6:10–8 pm. An 8-week course, June 11 to August 3: Section B—TTh 6:10–8 pm. Second Session: Section C—MWF 4:10–6 pm.

210B **Behavioral Factors in the Process of Change** (3)

Review of current research, theory, and practice related to the process of change. Basic principles of planned change; individual, group, organization, community, and cultural change. Emphasis on human behavior research and theory related to the change process. Prerequisite: Mgt 208. Second Session: MWF 4:10–6 pm.

225A **Managerial Statistics I** (3)

(Formerly Introduction to Managerial Statistics)

The mathematics of probability and statistics and its applications in management science and operations research. Topics include random variables; discrete and continuous probability distributions; moments and other descriptive measures; sampling theory; and an introduction to statistical estimation, hypothesis testing, and regression analysis. Prerequisite: Mgt 203 or equivalent. First Session: MWF 8:10–10 pm.

226B **Managerial Statistics II** (3)

Management applications of the theory and techniques of mathematical statistics. Topics include maximum likelihood and other methods of estimation, hypothesis testing, descriptive measures of bivariate distributions, regression and correlation, analysis of time series, econometric models and multiple regression, statistical decision theory, and the revision of probabilities in decision-making. Prerequisite: Mgt 225. Second Session: MWTh 8:10–10 pm.

228B **Techniques of Operations Research** (3)

(Formerly Systems Analysis by Simulation)

Survey and introduction to contemporary operations research techniques. Analytical methods such as simulation, queuing, Markov chains, dynamic programming, game theory, and network flows. Prerequisite: Mgt 225, 227. Second Session: MWTh 8:10–10 pm.

240A **Survey of Information Technology** (3)

(Formerly Mgt 218 Survey of Data Processing)

A management-oriented presentation of the vocabulary, concepts, and trends in computer hardware and software, information systems design and development, organizational impact, and effective management; milestones of past and current research; computer technology as a rapidly evolving force of major significance in business, government, and industry. Designed to provide comprehension of information technology necessary for contribution to an organizational information processing effort or as

191A **Special Topics** (3)

Summer 1973: topics in number theory. Admission by permission of instructor. May be repeated for credit. First Session: MTWThF 8:10–9:30 am.

269A **Integral Equations** (3)

Prerequisite: Math 123 or equivalent; Math 139, 140. First Session: MTWThF 7:35–8:55 pm.

295 **Reading and Research** (3)

May be repeated once for credit. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

Math 299A and 300A: both sessions.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

Mechanical Engineering

See "Engineering and Applied Science."

Music

George Steiner, *Chairman*

MUSIC HISTORY AND LITERATURE

3 **Introduction to Musical Understanding** (3)

Introductory history of musical styles, related to listening; elements and materials of music. First Session: Section A—MTWThF 11:10 am–12:30 pm; Section B—MTWTh 5:45–7:25 pm.

MUSIC THEORY

1A **Elements of Music Theory** (3)

Elements of music: notation, scales, keys, intervals, terms, rhythms, and chord structure. First Session: MTWThF 1:10–2:30 pm.

5–6 **Harmony** (3–3)

Triads, inversions; chord analysis, construction, and progression; part-writing, modulations, altered chords. Prerequisite: Mus 1 or satisfactory

passing of placement examination. First Session: Mus 5A; Second Session: Mus 6B. MTWThF 4:10–5:30 pm.

231–32 **Composition** (3–3)

May be repeated for credit. First Session: Mus 231A; Second Session: Mus 232B. As arranged.

299–300 **Thesis Research** (3–3)

Mus 299A and 300A: both sessions.

PPLIED MUSIC

pplied Music courses listed below are offered in both sessions and may be peated for credit. Each course has individual lessons of 45 minutes twice a eek; supplementary fee, $75.

11 **Piano** (1)

First Session: Section A; Second Session: Section B.

13 **Voice** (1)

First Session: Section A; Second Session: Section B.

15 **Organ** (1)

First Session: Section A; Second Session: Section B.

17 **Violin** (1)

First Session: Section A; Second Session: Section B.

19 **Classical Guitar** (1)

First Session: Section A; Second Session: Section B.

21 **Viola** (1)

First Session: Section A; Second Session: Section B.

23 **Cello** (1)

First Session: Section A; Second Session: Section B.

25 **Bass** (1)

First Session: Section A; Second Session: Section B.

27 **Flute** (1)

First Session: Section A; Second Session: Section B.

29 **Recorder** (1)

First Session: Section A; Second Session: Section B.

31 **Oboe** (1)

First Session: Section A; Second Session: Section B.

33 **Clarinet** (1)

First Session: Section A; Second Session: Section B.

35 **Saxophone** (1)

First Session: Section A; Second Session: Section B.

37 **Bassoon** (1)

First Session: Section A; Second Session: Section B.

39 **French Horn** (1)
First Session: Section A; Second Session: Section B.

41 **Trumpet** (1)
First Session: Section A; Second Session: Section B.

43 **Trombone** (1)
First Session: Section A; Second Session: Section B.

45 **Percussion** (1)
First Session: Section A; Second Session: Section B.

47 **Harp** (1)
First Session: Section A; Second Session: Section B.

111 **Piano** (1)
First Session: Section A; Second Session: Section B.

113 **Voice** (1)
First Session: Section A; Second Session: Section B.

115 **Organ** (1)
First Session: Section A; Second Session: Section B.

117 **Orchestral Instrument** (1)
First Session: Section A; Second Session: Section B.

119 **Classical Guitar** (1)
First Session: Section A; Second Session: Section B.

Operations Research

See "Engineering and Applied Science."

Philosophy

Thelma Z. Lavine, *Chairman*

50 **Introduction to Philosophy** (3)
Readings from major philosophers and of philosophic positions from Plato to the present. First Session: Section A—MTWThF 1:10–2:30 pm. Second Session: Section B—MTWThF 11:10 am–12:30 pm.

112B **History of Modern Philosophy** (3)
History of Western philosophy of the 17th and 18th centuries (Descartes to Kant). Second Session: MTWThF 8:10–9:30 am.

113A **19th Century Philosophy** (3)
European philosophy from Kant to Nietzsche. First Session: MTW ThF 9:40–11 am.

131A **Ethics** (3)

Theories of "the good" and "the right" from Plato to Sartre. First Session: MTWThF 11:10 am–12:30 pm.

172B **American Philosophy** (3)

Philosophies of Peirce, Royce, James, Dewey, and Santayana as representatives of American thought. Second Session: MTWThF 9:40–11 am.

193A **Contemporary Philosophy: Phenomenological** (3)

The phenomenological movement, including its development into German and French existentialism, and its more recent phases. First Session: MTWThF 8:10–9:30 am.

201–2 **Readings and Research** (3–3)

Advanced readings and reports. Investigation of special problems. First Session: Phil 201A; Second Session: Phil 202B.

299–300 **Thesis Research** (3–3)

Phil 299A and 300A: both sessions.

hysical Education, Health, and Recreation

L. Breen, *Chairman*

he University is not responsible for injuries received in intramural games, or any of the activities of the Department of Physical Education, Health, and ecreation; and the student assumes full responsibility therefor.

116A **Movement for Actors** (1)

A 3-week course, June 4 to 22: MTWThF 11:30 am–1 pm. (See Dance Workshop, pages 35–36.)

118A **Special Problems in Dance Composition** (1)

A 3-week course, June 4 to 22: MTWThF 11:30 am–1 pm. (See Dance Workshop, pages 35–36.)

*119B **Creative Dance for Children** (3)

Study of dance as an expressive medium for children; emphasis on concepts and principles, methods and materials. Consideration given to dance for children with special education problems. A 3-week course, July 2 to 20: MTWThF 10 am–1 pm.

120A **Repertory** (1 or 2)

A 3-week course, June 4 to 22: MTWThF 2–3:30 pm. (See Dance Workshop, pages 35–36.)

121A **Dance Technique I** (1)

A 3-week course, June 4 to 22: MTWThF 9:30–11 am. (See Dance Workshop, pages 35–36.)

urse requiring the full daytime attention of enrollees. Concurrent registration for another scheduled in morning or afternoon not permitted.

122A **Methods and Materials for Health Education** (3)
Conceptual approach to curriculum design and teaching, including planning and organization, methodology, selection and use of materials, and evaluation; basic health knowledge. First Session: MW 2–4 pm.

123A **Dance Technique II** (1 or 2)
A 3-week course, June 4 to 22: MTWThF 9:30–11 am. (See Dance Workshop, pages 35–36.)

184A **Workshop in Physical Education** (3)
A 10-day course, May 9 to 18: May 9 to 11 and 16 to 18: 5–9 pm; May 12 to 15, field activities as arranged. (See Movement Education Workshop, page 37.)

202A **Conceptual Basis of Motor Learning** (3)
Theories of learning and application to development of motor skills; motor theories of perceptual and conceptual learning. First Session: MW 6–8 pm.

232A **Current Issues in Elementary School Physical Education** (3)
Current philosophy, trends, and research; implications for curriculum, instruction, evaluation. First Session: TTh 6–8 pm.

250A **Administration of Urban Leisure Services** (3)
Planning and organization of a comprehensive system of urban leisure services utilizing educational, cultural, and recreational resources; emphasis on public relations, personnel administration and supervision, systems analysis, fiscal management and managerial accountability. First Session: MW 8–10 pm.

297A **Advanced Practicum and Topical Studies** (3)
Independent study pertinent to the needs of the student and/or field experience related to functional analysis of professional practice and job performance competencies. Prerequisite: Educ 295 or permission of instructor. May be repeated once for credit with permission of the adviser. First Session: As arranged.

For information concerning Dance Workshop and Movement Education Workshop, see pages 35–36, 37.

Physics

Julian Eisenstein, *Chairman*

1A **General Physics** (4)
Topics in classical physics which form a foundation for modern physics. Prerequisite: two years of college preparatory mathematics or concurrent registration for Math 6. Laboratory fee, $11. First Session: lecture MTTh 1:10–3 pm. Section L: recitation WF 8:10–9:30 am and laboratory MWF 9:40–12 am; Section S: recitation WF 1:10–2:30 pm and laboratory MWF 3:10–5:30 pm.

2B **Introduction to Modern Physics** (4)

Selected topics in modern physics, including relativity and quantum theory. Prerequisite: Phys 1 or equivalent. Laboratory fee, $11. Second Session: lecture MTTh 1:10–3 pm. Section J: recitation WF 8:10–9:30 am and laboratory MWF 9:40–12 am; Section P: recitation WF 1:10–2:30 pm and laboratory MWF 3:10–5:30 pm.

299–300 **Thesis Research** (3–3)

First Session: Phys 299A; Second Session: Phys 300A.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

Political Science

H.L. LeBlanc, *Chairman*

Departmental prerequisite: P Sc 4 and 6 or 5 and 6 are prerequisite to all second-group courses in Political Science.

5 **Introduction to Political Science** (3)

Introduction to the study of comparative political systems; emphasis on structures and processes of major foreign governments and the force of basic ideologies. Students who receive credit for P Sc 5 cannot receive credit for P Sc 4. First Session: P Sc 5A—MTWThF 1:10–2:30 pm. Second Session: P Sc 5B—MTWThF 11:10 am–12:30 pm.

6A **Introduction to Political Science** (3)

Introduction to the study of the structure, powers, and processes of the American political system. First Session: MTWThF 9:40–11 am.

101A **Far East in the Modern World** (3)

First Session: MTWThF 8:10–9:30 am. (See Russian-East Asian Studies program, pages 38–39.)

104A **Urban Politics** (3)

Demographic trends and implications, local metropolitan political systems, issues in urban politics, strategies of political change. First Session: MTWThF 9:40–11 am.

105A **Scope and Methods of Political Science** (3)

Nature of political inquiry, approaches to the study of politics and government, empirical methods of research. Prerequisite: Stat 51 or 53; or equivalent. First Session: MTWThF 1:10–2:30 pm.

106A **The Politics of Social Change** (3)

Theories of revolution and change; protest in American politics; urban violence and political change; institutional innovation, reform, and responsiveness; realistic and unrealistic strategies of change. First Session: MTWThF 11:10 am–12:30 pm.

111B **Comparative Government and Politics** (3)

Government and politics of the principal constitutional democracies of Western Europe. Second Session: MTWThF 1:10–2:30 pm.

*112B **Comparative Government and Politics** (3)

Government and politics of the communist nations; emphasis on the Soviet Union and the countries of Eastern Europe. Second Session: MTWThF 9:40–11 am.

*115B **Government and Politics in Eastern Europe** (3)

Second Session: MTWThF 2:40–4 pm. (See Russian-East Asian Studies program, pages 38–39.)

117–18 **Political Theory: Major Issues of Western Political Thought** (3–3)

P Sc 117: foundations of Western political thought, Plato to Aquinas. P Sc 118: philosophical roots of modern political order and disorder, Machiavelli to Rousseau. First Session: P Sc 117A—MTWThF 11:10 am–12:30 pm; P Sc 118A—MTWThF 1:10–2:30 pm.

125B **Legislative Process** (3)

Study of Congress and the state legislatures, including legislative power structure, selection of legislators and the roles they play, decision-making, and the relationship between the legislative and executive branches. Second Session: MTWThF 9:40–11 am.

126A **The American Presidency** (3)

Development of the institution, selection process, role of the presidency in policy-making. First Session: MTWThF 4:10–5:30 pm.

146B **Public Opinion and Political Socialization** (3)

Sources of mass political attitudes and behavior, effects of mass attitudes and behavior on public policy. Second Session: MTWThF 11:10 am–12:30 pm.

160A **Modern Communist Ideologies** (3)

First Session: MTWThF 4:10–5:30 pm. (See Russian-East Asian Studies program, pages 38–39.)

163A **Soviet Foreign Policy** (3)

First Session: MTWTh 5:45–7:25 pm. (See Russian-East Asian Studies program, pages 38–39.)

167B **U.S. Foreign Policy** (3)

Constitutional and political factors that determine the formulation, execution, and substance of U.S. foreign policy. Second Session: MTWThF 9:40–11 am.

171B **International Politics** (3)

International actors, international and domestic environments of foreign policy, global and regional patterns, general characteristics of foreign policy. Second Session: MTWThF 11:10 am–12:30 pm.

* P Sc 112, 115, and former P Sc 161 are related in their subject matter, and credit for only one of the three may be applied toward a degree.

178A **Latin America: Political Patterns and International Relations** (3)

U.S.-Latin American relations, inter-American diplomacy and organization, foreign policies of selected states, the Cuban revolution. First Session: MTWThF 4:10–5:30 pm.

179A **International Relations of the Middle East** (3)

Analysis of the regional and international relations of the Middle East. First Session: MTWThF 1:10–2:30 pm.

190B **Politics of Middle and Southern Africa** (3)

Comparative analysis of the political systems of selected countries of non-Mediterranean Africa. Second Session: MTWThF 1:10–2:30 pm.

191A **Governments and Politics of the Middle East** (3)

Domestic and international politics of the eastern Arab states, Turkey, Iran, Israel. First Session: MTWThF 11:10 am–12:30 pm.

193B **Governments and Politics of South and Southeast Asia** (3)

Second Session: MTWThF 11:10 am–12:30 pm. (See Russian-East Asian Studies program, pages 38–39.)

*194A **Governments of China and Japan** (3)

First Session: MTWThF 9:40–11 am. (See Russian-East Asian Studies program, pages 38–39.)

197B **Proseminar: International Affairs** (3)

Substantive problems of U.S. foreign policy. Readings, term papers, discussion. Second Session: MWF 2:40–4:50 pm.

199A **American Government and Politics** (3)

Proseminar: reading and research as a basis for analyzing significant problems. Open to seniors in Public Affairs and Political Science curricula. First Session: MWF 1:10–3:20 pm.

267 **Seminar: U.S. Foreign Policy** (3)

Enrollment limited to teachers. Second 3-week Education Workshop, July 2 to July 20: Section B—lecture and discussion MTWThF 9:30–11:30 am; Section C—lecture and discussion MTWThF 1:30–3:30 pm. Conferences and field work as arranged. (See Workshop in United States Foreign Policy, page 43.)

297 **Independent Study** (arr.)

Limited to Master's candidates. Permission of instructor, in writing, required. First Session: Section A; Second Session: Section B.

-300 **Thesis Research** (3–3)

P Sc 299A and 300A: both sessions.

For information concerning the special programs in Russian-East Asian Studies and United States Foreign Policy, see pages 38–39, 43.

162 and 194 are related in their subject matter, and credit for only one may be applied a degree.

Psychology

J.N. Mosél, *Chairman*

Departmental prerequisite: Psyc 1 or 5 or 6 is prerequisite to all other courses in Psychology. Six semester hours in Psychology courses are prerequisite to all second-group courses in Psychology. The departmental prerequisite may be waived with the permission of the instructor.

Third-group courses are limited to graduate students in Psychology, except by special permission of instructor and Chairman of the Department.

1 **General Psychology** (3)

Fundamental principles underlying human behavior. First Session: Section A—MTWThF 1:10–2:30 pm; Section B—MTWThF 4:10–5:30 pm. Second Session: Section C—MTWThF 8:10–9:30 am; Section D—MTWThF 4:10–5:30 pm.

6A **Principles and Methods of Psychology** (3)

An experimental approach to understanding behavior; individual and class experiments performed. Topics of motivation, learning, memory, and problem-solving. Laboratory fee, $6. First Session: lecture MWF 1:10–3 pm, laboratory TTh 1:10–3 pm.

8A **Psychology of Motivation and Personality** (3)

Introduction to the psychology of personality. Principles of motivation, personality development, social and cultural factors, and assessment and description of personality emphasized. First Session: MTWThF 1:10–2:30 pm.

22 **Introduction to Educational Psychology** (3)

The contributions of psychology to education; emphasis on learning. First 3-week Education Workshop Session, June 11 to 29: Section A—June 12–15, lecture 3:45–5:45 pm, small group discussions—evening; June 18 to 29, lecture 10:10–12 am, conference 9:10–10 am. Second Session: Section B—MTWThF 1:10–2:30 pm.

29A **Psychology of Childhood** (3)

Developmental approach to study of the child. Emphasis on the socialization process, learning, and the child's view of the world. First Session: MTWThF 1:10–2:30 pm.

101B **Abnormal Psychology** (3)

Causes, diagnosis, treatment, and prevention of various types of maladjustments and mental disorders. Prerequisite: 6 semester hours in psychology, or 3 in psychology and 6 in a biological science. Second Session: MTWThF 8:10–9:30 am.

110A **Cognitive and Perceptual Development** (3)

Concepts and research in the area of developmental psychology; emphasis on the growth and development of perception, cognition, and language. First Session: MTWThF 4:10–5:30 pm.

115A **Psychology of Language and Communication** (3)

Introduction to psycholinguistics and verbal behavior. Information theory, generative grammar theory, cultural and linguistic structures in the perception and learning of language. First Session: MTWThF 4:10–5:30 pm.

121A **Psychology of Learning** (3)

Theories and issues related to basic learning processes as determinants of behavior. Emphasis on current research using both human and animal subjects. First Session: MTWThF 4:10–5:30 pm.

129 **Theories of Personality** (3)

Survey of personality theories; emphasis on their application to problems of individuals. First Session: Section A—MTWThF 11:10 am–12:30 pm. Second Session: Section B—MTWTh 7:35–9:15 pm.

131B **Psychological Tests** (3)

Survey of psychological tests and their more common uses in business, industry, government, law, medicine, and education. Material fee, $7. Second Session: MTWThF 11:10 am–12:30 pm.

145A **Psychology of Management** (3)

Primarily for students in the schools of Engineering and Applied Science and Government and Business Administration. Psychological aspects of managing work organizations. First Session: MWTh 6:10–8 pm.

151A **Social Psychology** (3)

Social foundations of attitudes and behavior: cognition, motivation, role-behavior, communication, small-group processes, racial attitudes, nationalism, and war. First Session: MTWThF 9:40–11 am.

156B **Psychology of Attitudes and Public Opinion** (3)

Psychology of opinion formation, measurement of opinion, social determinants of attitudes, psychological processes in propaganda, bases of receptivity to propaganda, psychological warfare. Second Session: MTWTh 7:35–9:15 pm.

191 **Independent Research in Psychology** (3)

Opportunity for work on individual library or experimental projects. Open to qualified students by permission; arrangements must be made with the sponsoring faculty member prior to registration. May be repeated once for credit. First Session: Section A; Second Session: Section B.

196B **History and Systems of Psychology** (3)

Senior capstone course which includes a survey and integration of the major viewpoints and concepts of psychology. Required of Psychology majors. Second Session: MTWThF 9:40–11 am.

211B **Assessment of Cognitive Functioning** (3)

Concepts of intelligence and achievement and their assessment through a variety of group and individual procedures. Emphasis on evaluation of children. Material fee, $7. Admission by permission of instructor. Second Session: MWTh 4:10–6 pm.

212B **Personality Assessment by Projective Techniques** (3)

Methods of personality assessment, including psychometric and projective tests. Material fee, $7. Admission by permission of instructor. Second Session: MWTh 6:10–8 pm.

215A **Personality Assessment by Multiple Procedures** (3)

Consideration and use of a wide range of procedures in assessment of personality and psychopathology of children. Prerequisite: Psyc 207–8 or 211 and 212. Graduate students in fields other than Psychology admitted by permission of instructor. Material fee, $7. First Session: MWTh 6:10–8 pm.

234A **Seminar: Theory of Psychological Measurement** (3)

Development of classical axiomatic-deductive theory underlying major notions in the construction and evaluation of psychological tests. First Session: MWTh 6:10–8 pm.

272A **Seminar: Theories of Personality** (3)

Emphasis on theoretical problems and methodology in the field of personality study. First Session: MWTh 4:10–6 pm.

283–84 **Practicum in Clinical Psychology** (3–3)

Supervised practical instruction in agencies doing clinical psychological work. Prerequisite: Psyc 212. Admission by permission of instructor. First Session: Psyc 283A and 284A; Second Session: Psyc 283B and 284B.

289A **Seminar: Current Topics in Experimental Psychology** (3)

Review and discussion of contemporary research and theory in a specialized field of psychological study, by leaders in the field. Independent topics each time the course is offered; may be repeated for credit. First Session: As arranged.

295 **Independent Research in Psychology** (3)

Individual library or experimental research under supervision of staff member. Arrangements must be made with sponsoring faculty member prior to registration. May be repeated once for credit. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

Psyc 299A and 300A: both sessions.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy comprehensive examinations. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

Public Administration

D.S. Brown, *Chairman*

215A **Comparative Administrative Systems** (3)

Examination and analysis of the administrative systems of selected foreign governments; attention to practices applicable to administration in the United States. First Session: MWF 6:10–8 pm.

223B **Behavioral Factors in Large Organizations** (3)

Analysis of the nature and characteristics of bureaucracy; dysfunctionalism; approaches to policy guidance and leadership, particularly in large public organizations; influence and control systems. Second Session: TTh 6:10–9 pm.

245B **Managing the Changing Federalism** (3)

An analysis of organic changes in the administration and management of intergovernmental programs in a rapidly changing American Federalism. Federal, state, regional, and locally shared systems will be studied from theoretical and practical vantages. Second Session: MWF 4:10–6 pm.

248A **Financing Metropolitan Services** (3)

Analysis of the structure and administration of public finance of local governments. First Session: TTh 6:10–9 pm.

251B **Governmental Budgeting** (3)

Survey of the basic concepts, principles, and practices in governmental budgeting; interrelationship of planning, programming, and budgeting; their role in the management process. Second Session: MWF 6:10–8 pm.

260A **Seminar: Policy Formulation and Administration** (3)

Analysis in depth of factors and processes involved in policy development with particular attention to selected areas of national policy; development of agency goals and objectives. First Session: MWF 6:10–8 pm.

299A **Thesis Seminar** (3)

Examination of thesis standards, research philosophy and methodology. First Session: TTh 6:10–9 pm.

eligion

G. Jones, *Chairman*

59–60 **History of Religions** (3–3)

Origins, evolution, and contemporary status in historical context. Rel 59: primitive religion and the religions of the East (Hinduism, Buddhism, Taoism, Confucianism, Shinto). Rel 60: religions of the West and Near East (ancient religions, Judaism, Christianity, Islam). First Session: Rel 59A; Second Session: Rel 60B. MTWThF 11:10 am–12:30 pm.

126A **Western Mysticism** (3)

Study of the phenomenon of religious experience and of selected mystics

in Judaism, Christianity, and Islam. First Session: MTWThF 9:40–11 am.

137A **The Land of Israel and the Growth of the Western Religions** (6)
(See Summer Institute in Israel, page 40.)

162A **Symbolism in the History of Religions** (3)
Religious symbolism, myth, legend, and ritual in the religions of the world; various theoretical analyses. First Session: MTWTh 5:45–7:25 pm.

172B **Religion in American Culture** (3)
Growth of religious bodies and institutions in relation to American culture, development of religious thought, and analysis of the contemporary religious scene. Second Session: MTWTh 5:45–7:25 pm.

291–92 **Readings and Research** (3–3)
Investigation of special problems. First Session: Rel 291A and 292A; Second Session: Rel 291B and 292B.

299–300 **Thesis Research** (3–3)
Rel 299A and 300A: both sessions.

For information concerning the Summer Institute in Israel, see page 40.

Russian

See "Slavic Languages and Literatures."

Slavic Languages and Literatures

C.A. Moser, *Chairman*

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

5–6 **Intensive Beginning Russian** (6–6)
Beginners' intensive course in the fundamentals of Russian. Prerequisite to Slav 6: Slav 2 or 5. Laboratory fee, $17.50 a session. First Session: Slav 5A; Second Session: Slav 6B. Classroom—MTWThF 9:30–11:30 am and 12:30–2:30 pm, laboratory—TTh 3:10–4 pm.

47A **Beginning Russian for Reading** (3)
For students with little or no knowledge of Russian who wish to learn to read the language only. Credit assigned only after completion of

Slav 49. No academic credit for graduate students. First Session: MTWTh 5:45–7:25 pm.

49B **Russian Reading** (3)

Primarily for graduate students preparing for reading examinations in the natural and social sciences. No academic credit for graduate students. Prerequisite: Slav 47 or equivalent. Second Session: MTWTh 5:45–7:25 pm.

91–92 **Introduction to Russian Literature** (3–3)

Emergence and development of Russian literature and ideas from earliest times to the early 20th century—in English. First Session: Slav 91A; Second Session: Slav 92B. MTWTh 7:35–9:15 pm.

Sociology

R.G. Brown, *Chairman*

Departmental prerequisite: Soc 1 is prerequisite to all second- and third-group courses in Sociology.

1A **Introductory Sociology** (3)

General principles of sociology; development of culture and personality, impact of groups and institutions on man's social behavior. Survey of fields within sociology. First Session: MTWThF 11:10 am–12:30 pm.

2B **American Social Problems** (3)

Analysis of major social problems confronting the United States; factors producing social problems, their nature and treatment. Second Session: MTWThF 9:40–11 am.

61A **Development of Social Thought** (3)

Examination of concepts and theories relevant to the nature of society and human relationships from ancient writings to the 20th century. Prerequisite: Soc 1. First Session: MTWThF 1:10–2:30 pm.

110A **The Sociology of Work** (3)

Introductory survey of industrial sociology; sociology of occupations and professions; industry-community relations; and analysis of large, complex organizations. First Session: MTWThF 9:40–11 am.

124B **Medical Sociology** (3)

Social factors and processes related to the etiology and treatment of physical and mental illness; medical occupations and professions, medical organizations, problems of delivery of health care services. Second Session: MTWThF 9:40–11 am.

126A **Urban Sociology** (3)

Place of the city in larger society; growth of the city, problems of urban living, group life, personality, urban housing, city planning, and suburban development. First Session: MTWThF 11:10 am–12:30 pm.

127A **Population Problems** (3)

Composition of populations, trends in population growth and population

pressure, factors producing population movements, effects of migration, population policies—eugenics and birth control. First Session: MTW ThF 9:40–11 am.

129A **Race and Minority Groups** (3)

Analysis of relationships between dominant and minority groups in society, particularly in the United States; nature and range of problems; analysis of the phenomenon of prejudice. First Session: MTWThF 8:10–9:30 am.

132B **Political Sociology** (3)

Analysis of problems involved in the study of power relations in society; distribution of power in society; types and processes of government; political participation and political mobilization. Second Session: MT WThF 11:10 am–12:30 pm.

133A **Sociology of Education** (3)

Analysis of educational systems from institutional perspectives and as agencies of socialization; relationships of education in general to society, including technological, communal, and subcultural components. First Session: MTWThF 9:40–11 am.

135A **Juvenile Delinquency** (3)

Factors producing delinquency, juvenile detention, the juvenile court, training schools, treatment of offenders. First Session: MTWThF 1:10–2:30 pm.

136A **Criminology** (3)

Nature and distribution of crime as related to the development and operation of criminal law and various social and legal institutions in urban society. First Session: MTWThF 9:40–11 am.

143B **Social Movements** (3)

General survey of the various forms of collective behavior (fads, panics, riots, social movements, etc.), and a more detailed study of the genesis, development, and decay of social movements and social revolutions. Second Session: MTWThF 4:10–5:30 pm.

144A **Public Opinion and Mass Communication** (3)

Communication process with emphasis on international communications, propaganda, and mass media; measurement of propaganda campaigns. First Session: MTWThF 8:10–9:30 am.

149B **Modern Sociological Theory** (3)

Systematic study of contemporary schools of sociological theory, both European and American development; evaluation of scientific contributions of each school. Prerequisite: Soc 61. Second Session: MTWThF 11:10 am–12:30 pm.

295 **Research** (3)

May be repeated once for credit. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

Soc 299A and 300A: both sessions.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

Spanish

Administered by the Department of Romance Languages and Literatures, J.F. Burks, *Chairman*

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

Departmental prerequisite: Span 3–4 or 6, or equivalent, is prerequisite to all second-group courses in Spanish.

1–2 **First-year Spanish** (3–3)

A year course: credit toward a degree at this University given on completion of Span 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern Spanish prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a session. First Session: Span 1A; Second Session: Span 2B. Classroom—MTWThF 8:10–9:30 am, laboratory—MTh 10:10–11 am.

3–4 **Second-year Spanish** (3–3)

A year course: credit toward a degree at this University given on completion of Span 4. Conversation, grammar, composition, reading of modern Spanish prose, introduction to Hispanic civilization. Aural training, oral practice in language laboratory. Prerequisite: Span 1–2, 2*x*, or two years of high school Spanish. Laboratory fee, $17.50 a session. First Session: Span 3A; Second Session: Span 4B. Classroom—MTWThF 11:10 am–12:30 pm, laboratory—MTh 9:10–10 am.

9–10 **Spanish Conversation and Composition** (3–3)

Prerequisite: Span 4 or equivalent and permission of instructor. First Session: Span 9A—MTWThF 11:10 am–12:30 pm; Second Session: Span 10B—MTWThF 9:40–11 am.

130A **The Modern Spanish Essay** (3)

Development of the Spanish essay from the 16th century; emphasis on the 18th and 19th centuries. Class analysis of texts, collateral reading, and lectures. First Session: MTWThF 1:10–2:30 pm.

135B **The Spanish Theatre of the Realist Period** (3)

Study and analysis of the works of Ventura de la Vega, López de Ayala, Tamayo y Baus, Echegaray, and Pérez Galdós. Second Session: MTWThF 1:10–2:30 pm.

141A **Introduction to Spanish American Literature** (6)

Highlights of Spanish American literature through the colonial and modern periods. Of special interest to majors in Latin American Studies. First Session: MTWThF 9:40–11 am and 1:10–2:30 pm.

193A **Curso de estilo** (3)

Advanced grammar, composition, and stylistics. Open to both advanced undergraduate and graduate students. Recommended for majors and teachers of Spanish. First Session: MTWThF 4:10–5:30 pm.

299A **Thesis Research** (3)

First Session.

Special Education

Perry Botwin, *Chairman*

SIX-WEEK COURSES—JUNE 11 TO JULY 20

261A **Methods for Teaching Impaired Young Children** (3)

(Formerly Special Methods for Teaching Young Children)

Lecture, workshop, demonstrations. Specialized techniques, curricula, and materials used with young children. Students develop and experiment with new methods and materials. Admission by permission of instructor. Limited to 20 students. Two evenings a week as arranged: 6–9 pm.

291A **Practicum in Crisis/Resource Teaching** (6)

(Formerly Practicum in Teaching Children with Behavioral Problems)

Supervised student teaching in programs for children with behavioral problems. Under the direction of a qualified teacher and the supervision of the University staff. Minimum of 210 clock hours required. As arranged.

292A **Practicum in Teaching Young Children in Special Education** (6)

Supervised student teaching in special education in classrooms for young children. Minimum of 210 clock hours required. As arranged.

NINE-WEEK COURSES—JUNE 11 TO AUGUST 10

250A **Specialized Techniques and Materials for Diagnostic-Prescriptive Teachers** (3)

Selected materials and techniques used in diagnostic-prescriptive teaching. Must be taken concurrently with S Ed 252. Admission by permission of instructor. As arranged.

252A **Professional Internship for Diagnostic-Prescriptive Teachers** (6)

Supervised school experience in diagnostic-prescriptive teaching. Must be taken concurrently with S Ed 250. Admission by permission of instructor. A minimum of 280 clock hours required. As arranged.

294A **Practicum in Diagnostic-Prescriptive Teaching** (9)

Supervised field experience in diagnostic-prescriptive teacher programs.

Minimum of 420 clock hours required. Admission by permission of instructor. As arranged.

FIRST 3-WEEK EDUCATION WORKSHOP SESSION—JUNE 11 TO JUNE 29

Classes meet Monday through Friday. Each workshop course requires the full day; concurrent registration for another daytime course is not permitted. June 12 to 15—small group discussions, evening; June 18 to 29—small group discussions and field work, afternoon.

170A **Interpersonal/Intrapersonal Relationships for Teachers** (3)

Consideration of factors leading to successful interaction with children. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 9–12 am.

240A **Educational Programming for Children with Behavioral Problems** (3)

Analysis of educational provisions for children with behavioral problems through study of ecological considerations in the light of contemporary special education theory. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 9–12 am.

251A **Psychosocial Factors in Diagnostic-Prescriptive Teaching** (3)

Psychosocial factors significant in the process of diagnostic-prescriptive teaching. Admission by permission of instructor. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 9–12 am.

266A **Problems in Language Development in Exceptional Children** (3)

Introduction to the study of language acquisition and the application of current research on language of handicapped children. June 12 to 15: lecture 3:45–5:45 pm. June 18 to 29: lecture 9–12 am.

297A **Individual Study in Special Education** (3)

Individual study or research under guidance of staff member. Program and conferences arranged with adviser. Admission by permission of adviser. As arranged.

453A **Doctoral Internship: Special Education** (3)

Supervised professional internship in college teaching, administration, supervision, or private agency function. Each internship individually arranged. Admission by permission of adviser. As arranged.

491A **Dissertation Research** (arr.)

COND 3-WEEK EDUCATION WORKSHOP SESSION—JULY 2 TO JULY 20

asses meet Monday through Friday. Concurrent registration for another day-e course is not permitted, because each workshop course requires the full —lecture and conference in the morning; small group discussion and field rk or laboratory in the afternoon.

201B **Introduction to Special Education** (3)

Survey course to acquaint prospective teachers with special education and to help them become aware of the various educational modifications necessary to accommodate children in a school program. Lecture 9–12 am.

260B **Identification and Assessment of the Educational Needs of Young Children** (3)

(Formerly Diagnosis of the Educational Needs of Young Children)

Observation-demonstration course designed in preparation for informal evaluation techniques. Admission by permission of instructor. Lecture 9–12 am.

297B **Individual Study in Special Education** (3)

Individual study or research under guidance of staff member. Program and conferences arranged with adviser. Admission by permission of adviser. As arranged.

342B **Seminar: Crisis/Resource Teaching** (3)

Topics and concepts relevant to an exploration of alternative models in the education of children perceived as having learning/behavior problems. Admission by permission of instructor. Lecture 9–12 am.

370B **Intrapersonal Dynamics in Special Education** (3)

Small group exploration of intrapersonal factors essential to understanding roles and interpersonal techniques in teaching exceptional children. Admission by permission of instructor. Lecture 9–12 am.

453B **Doctoral Internship: Special Education** (3)

Supervised professional internship in college teaching, administration, supervision, or private agency function. Each internship individually arranged. Admission by permission of adviser. As arranged.

491A **Dissertation Research** (arr.)

THIRD 3-WEEK EDUCATION WORKSHOP SESSION—JULY 23 TO AUGUST 10

Classes meet Monday through Friday. Concurrent registration for another daytime course is not permitted, because each workshop course requires the full day—lecture and conference in the morning; small group discussion and field work or laboratory in the afternoon.

200C **Understanding Young Exceptional Children** (3)

Lecture and field experience. Basic concepts of early child development as applied to special education. Lecture 9–12 am.

290C **Control and Management Techniques in the Classroom** (3)

Examination of the theory, techniques, and tools essential for group control. Designed to provide practice as well as familiarity with the various theories of control of human behavior. Admission by permission of instructor. Lecture 9–12 am.

297C **Individual Study in Special Education** (3)

Individual study or research under guidance of staff member. Program and conferences arranged with adviser. Admission by permission of adviser. As arranged.

454C **Doctoral Internship: Special Education** (3)

Supervised professional internship in college teaching, administration, supervision, or private agency function. Each internship individually arranged. Admission by permission of adviser. As arranged.

491A **Dissertation Research** (arr.)

Speech and Drama

G.F. Henigan, *Chairman*

1 Communicative Speaking and Listening (3)

Basic theories and principles of speech communication; composition, delivery, and criticism of speaking in interpersonal, group, and public situations. Recording fee, $2. First Session: Section A—MTWTh 5:45–7:25 pm. Second Session: Section B—MTWThF 1:10–2:30 pm.

11A Voice and Diction (3)

Development of naturalness, correctness, and clarity in conversational speech. Analysis and correction of individual speech delivery faults through tapes and weekly performances. Recording fee, $4. First Session: MTWThF 11:10 am–12:30 pm.

45A Understanding the Theatre (3)

The art of the theatre; its literature, aesthetics, and mechanics. Contributions of the playwright, actor, director, and designer examined through lectures, visiting artists, class discussions, and attendance at theatrical performances. Primarily for nonmajors. First Session: MTWThF 4:10–5:30 pm.

115A Acting (3)

Study and practice of fundamentals of acting technique: sense memory, improvisation, character analysis, role development. Prerequisite: Sp&D 32. First Session: MTWThF 1:10–2:30 pm.

121A Group Discussion and Conference Leadership (3)

Process of thinking and problem-solving in committees and small groups; methods of leading discussions and conferences. Prerequisite: Sp&D 1 or permission of instructor. First Session: MTWThF 8:10–9:30 am.

126A Argumentation and Debate (3)

Study of the advocacy system; special emphasis on issue identification, use of evidence, and logical proof. Extensive practice in argumentative speaking. Prerequisite: Sp&D 1 or permission of instructor. First Session: MTWThF 4:10–5:30 pm.

151B Stagecraft (3)

Theories and practicum in the technical aspects of production. Second Session: MTWThF 4:10–5:30 pm.

155B Play Production Practice (1)

Practical work in theatre: assigned production duties, special projects under instructor's supervision. May be repeated for a total of 4 semester hours of credit. Admission by permission of instructor. Second Session: As arranged.

169B Introduction to Creative Dramatics (3)

Study of philosophies and practices underlying dramatics with children; materials and methods for conducting improvised dramatic activities in elementary and secondary education. Second Session: MTWTh 5:45–7:25 pm.

182A **Introduction to Audiology** (3)

June 18 to July 19: MTWTh 2:50–4:30 pm. (See Summer Institute in Speech Pathology and Audiology, pages 41–42.)

184 **Clinical Practice in Speech and Hearing** (1)

Supervised case work in speech and hearing in the University Speech and Hearing Clinic and selected off-campus facilities. May be repeated for a total of 3 semester hours of credit. Prerequisite: Sp&D 183. First Session: Section A; Second Session: Section B.

277A **Advanced Clinical Procedures in Speech and Hearing** (3)

June 18 to July 19: MTWTh 10:50 am–12:30 pm. (See Summer Institute in Speech Pathology and Audiology, pages 41–42.)

278 **Advanced Clinical Practice in Speech and Hearing** (1)

First Session: Section A; Second Session: Section B.

291 **Seminar: Speech Pathology** (3)

June 18 to July 19: Section A—MTWTh 9–10:40 am. (See Summer Institute in Speech Pathology and Audiology, pages 41–42.) Second Session: Section B—Topic: Conditioning in Speech and Language Disorders. MTWTh 9–10:40 am.

292A **Seminar: Audiology** (3)

June 18 to July 19: MTWTh 1–2:40 pm. (See Summer Institute in Speech Pathology and Audiology, pages 41–42.)

294 **Independent Research in Dramatic Art** (arr.)

May be repeated for credit. First Session: Section A; Second Session: Section B.

295 **Independent Research in Speech and Hearing** (arr.)

May be repeated for credit. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

Sp&D 299A and 300A: both sessions.

For information concerning the Summer Institute in Speech Pathology and Audiology, see pages 41–42.

Statistics

Herbert Solomon, *Chairman*

Departmental prerequisite: one entrance unit in algebra is prerequisite to all first-group courses in Statistics.

Stat 51, 53, and 91 are related in their subject matter, and credit hours for only one of the three may be applied toward a degree. Stat 52 lies outside of this group, and may be taken for degree credit in combination with any one of the other three.

49A **The Language of Statistics** (0)

For M.A. and Ph.D. students in the Graduate School of Arts and Sciences as a minimum option in lieu of a foreign language. No academic credit. Tuition fee, $258. First Session: MTWTh 5:45–7:25 pm.

51A **Introduction to Business and Economic Statistics** (3)

Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, time series, index numbers. Laboratory fee, $18. First Session: lecture MTWThF 9:40–11 am, laboratory as arranged.

53B **Introduction to Statistics in Social Science and Education** (3)

(Formerly Introduction to Statistics in Psychology and Education)

Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, analysis of variance. Laboratory fee, $18. Second Session: lecture MWF 11:10 am–12:30 pm, laboratory TTh 11:10 am–12:30 pm.

91A **Principles of Statistical Methods** (3)

Variables and attributes, averages and dispersion, frequency distributions and their characteristics, regression and correlation, statistical decision processes. Laboratory fee, $18. First Session: lecture MTWThF 1:10–2:30 pm, laboratory as arranged.

97A **Introduction to Computer Programming** (3)

Computer and programming concepts. High-level language programs written by students will be run on the University computer. Laboratory fee, $25. First Session: lecture MWF 6–7:20 pm, laboratory TTh 6–7:20 pm.

*104A **Statistics in the Behavioral Sciences and Education I** (3)

Introductory study of statistical techniques for research problems in behavioral sciences and education. Laboratory fee, $18. First Session: lecture MTWTh 1:10–2:30 pm, laboratory TTh 2:40–4 pm.

117B **Analysis of Variance** (3)

Introduction to the design of experiments and analysis of variance; random block, factorial, Latin square, and analysis of covariance. Prerequisite: Stat 118. Laboratory fee, $18. Second Session: MWF 5:10–7 pm, laboratory TTh 5:10–6 pm.

118A **Regression Analysis** (3)

Regression and correlation theory; simple, partial, and multiple. Prerequisite: 3 semester hours selected from Stat 51, 53, 91, 104, 107. Laboratory fee, $18. First Session: lecture MWF 5:10–7 pm, laboratory TTh 5:10–6 pm.

119A **Bases of Statistical Decision-making** (arr.)

For students in the Navy Graduate Financial Management Program only. Introduction to techniques of decision-making; emphasis on applications rather than theory. June 4 to July 27: As arranged.

* not be taken for credit by students who have received credit for Stat 51, 53, or 91.

297A **Problems in Mathematical Statistics** (3)
First Session: MWF 3:10–5 pm.

299–300 **Thesis Research** (3–3)
Stat 299A and 300A: both sessions.

399A **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

Urban and Regional Planning

D.C. McGrath, Jr., *Chairman*

201A **Introduction to Urban Planning** (3)
Introduction to history, concepts, and activities of urban planning. Discussion of trends in urbanism and the influences of technical and social change. First Session: TTh 6:10–9 pm.

205B **Urban Housing** (3)
Examination of the housing problem: housing market characteristics, analytical techniques, national needs, costs, financing, federal programs, technology, rehabilitation, and policy formulation. Prerequisite: U&RP 201. Second Session: MW 6:10–9 pm.

207B **Land Development Planning** (3)
Selected problems in urban and regional planning: applications of zoning, urban renewal, and special programs available for the implementation of development plans. Prerequisite for Urban and Regional Planning students: U&RP 201. Second Session: TTh 6:10–9 pm.

209A **Urban Transportation Models** (3)
Consideration of land use activity, trip generation and distribution, modal choice models, traffic assignment, and decision-making techniques. Review of detail studies, calibration, interactions, applications, and accuracy limitations of various mathematical models. Prerequisite: U&RP 208 or permission of instructor. First Session: MW 6:10–9 pm.

295 **Urban Research** (3)
Directed research and investigation of special problems in community development. May be repeated once for credit. First Session: Section A; Second Session: Section B.

299A **Thesis Seminar** (3)
Both sessions: As arranged.

300A **Thesis Research** (3)
Both sessions.

CONSORTIUM LANGUAGE COURSES—SUMMER 1973

OREIGN LANGUAGES (other than French, German, and Spanish) which will be fered at American University, Catholic University of America, George ashington University, Georgetown University, and Howard University, all embers of the Consortium of Universities of the Washington Metropolitan rea, Inc., during the 1973 Summer Sessions are listed below. Students should nsult catalogues of the various universities for credit, schedules, and other formation.

RABIC

ementary Standard Arabic I, II	Howard
tensive Basic Modern Standard Arabic	Georgetown
tensive Intermediate Modern Standard Arabic	Georgetown
tensive Basic Colloquial Iraqui Arabic	Georgetown
tensive Basic Colloquial Egyptian Arabic	Georgetown

INESE

ginning Intensive Mandarin Chinese	George Washington
ensive Advanced Chinese	Georgetown

EEK

mentary Greek	Catholic

USA

usa, I, II	Howard

LIAN

mentary Italian	Catholic
nsive Basic Italian I, II	Georgetown
nsive Italian	Catholic

ANESE

nsive Basic Japanese	Georgetown
nsive Advanced Japanese	Georgetown

LATIN

Intermediate Latin	Catholic

LINGALA

Lingala, I, II	Howard

PORTUGUESE

Elementary Portuguese	Catholic
Intensive Basic Portuguese	Georgetown
Intensive Intermediate Portuguese	Georgetown
Intensive Advanced Portuguese	Georgetown

RUSSIAN

Elementary Russian	American, Catholic
Intensive Basic Russian I, II	Georgetown
Intensive Beginning Russian	George Washington
Intensive Advanced Russian I, II	Georgetown

SANSKRIT

Elementary Sanskrit	Catholic

SWAHILI

Swahili I, II	Howard

YORUBA

Yoruba I, II	Howard

APPENDIX: RECENTLY ESTABLISHED REGULATIONS

HE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subject
change in connection with the establishment of judicial processes. Bulletins
nd handbooks incorporating any changes will be issued as appropriate.

**he following resolution, submitted by the University Senate, was approved by
e University's Board of Trustees on October 19, 1968:**

Whereas, safety and order are essential preconditions of the learning process,
d indeed of the very concept of a university; and
Whereas, The George Washington University is committed to protection of
e speech and freedom of assembly, and to safeguarding the right of lawful
otest on campus; and is committed equally to maintaining the peace and
fety of the campus, in the knowledge that all rights are in jeopardy when
olence and civil disorder prevail over law and reason;
*Now, therefore, be it resolved by the Senate of The George Washington Uni-
sity:* that in the event a demonstration at this University exceeds the bounds
free assembly and lawful advocacy, and demonstrators are engaging in
awful acts which cause or imminently threaten injury to persons or property,
which obstruct or interfere with normal and necessary University activities,
body affirms the authority of the President, or other University officials
gnated to act in his absence, to take such reasonable steps, if possible after
sultation with the Chairman of the Executive Committee of the University
ate* and the President of the Student Body, as are required to restore and
erve order; including, if deemed necessary and appropriate, suspension of
ents or faculty engaging in such acts, and use of such law enforcement
onnel as are needed to effect the removal, arrest, and prosecution of law
tors. Any such suspension shall be reviewed by an appropriate tribunal
on after order is restored as is practicably possible.

**following was approved by the University's Board of Trustees on October
968:**

y student suspended from The George Washington University on the
nds of exceeding the bounds of free assembly and lawful advocacy shall
his suspension reviewed by the Hearing Committee on Student Affairs†
e George Washington University as soon after order is restored as is
cably possible.

---

*University Senate has been renamed the Faculty Senate.
†Duties and functions of the Hearing Committee on Student Affairs are now performed by the
Faculty Committee on Appeals.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968:

The George Washington University is opposed to discrimination based on race, color, or creed. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the Faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

(a) who engages in conduct that unreasonably obstructs teaching, research, and learning, or

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

(c) who disobeys general regulations of the University, or

(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established within the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*

*The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

ANNUAL ISSUES OF THE UNIVERSITY BULLETIN

Requests for the following publications must include your zip code and should be addressed as indicated.

COLLEGE OF GENERAL STUDIES, Dean of the School

NATIONAL LAW CENTER, Dean of the Center

SCHOOL OF ENGINEERING AND APPLIED SCIENCE, Dean of the School

UNDERGRADUATE AND GRADUATE CATALOGUE (Arts and Sciences, Education, Government and Business Administration, Public and International Affairs), Office of Admissions

SCHOOL OF MEDICINE, Admissions Office, School of Medicine

SUMMER SESSIONS CATALOGUE, Dean of the Summer Sessions

SCHEDULE OF CLASSES: FALL AND SPRING SEMESTERS, Registrar

SCHEDULE OF CLASSES: SUMMER SESSIONS, Dean of the Summer Sessions

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1/73—Cornelius—20M

Students registered at George Washington University during the spring semester 1973 should not apply for admission to the Summer Sessions, but should report on June 11 to the first floor of the University Library, where detailed information and the necessary registration materials will be provided.

REQUEST FOR APPLICATION FOR ADMISSION TO 1973 SUMMER SESSIONS

I am a ☐ student at another college wishing to earn credit for transfer.

I am a ☐ new student or former GWU student (prior to the 1973 Spring Semester) wishing to be admitted or readmitted to

- ☐ Nondegree status at GWU
- ☐ Bachelor's degree program
- Graduate degree program in:
  - ☐ Arts & Sciences
  - ☐ Education
  - ☐ Engineering & Applied Science
  - ☐ Government & Business Administration
  - ☐ Public & International Affairs
- National Law Center
  - ☐ J.D. program ☐ Post-J.D. program

Mail application form to:

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No. Street

_____
City State Zip Code

Place a 6¢
Stamp Here

DEAN OF THE SUMMER SESSIONS
GEORGE WASHINGTON UNIVERSITY
WASHINGTON, D. C. 20006

COLLEGES AND SCHOOLS—DEGREE PROGRAMS

COLUMBIAN COLLEGE OF ARTS AND SCIENCES: Associate in Arts (A.A.), Associate in Arts in General Studies (A.A. in Gen.Std.), Bachelor of Arts (B.A.), Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bachelor of Science in Environmental Health (B.S. in Env.Health), Bachelor of Science in Geodetic and Cartographic Science (B.S. in Geod. and Cart.Sc.), Bachelor of Science in Medical Technology (B.S. in Med.Tech.), and Bachelor of Science in Oceanography (B.S. in Ocea.)

GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master of Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.), Master of Music (Mus.M.), Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers), Master of Science in Forensic Science (M.S. in Forens.S.), Master of Science in Special Studies (M.S. in Sp.Std.), and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE: Associate in Science (A.S.), Bachelor of Science in Allied Health Science (B.S. in A.H.S.), and Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master of Comparative Law (M.Comp.L.), Master of Comparative Law (American Practice) (M.Comp.L.(Am.Prac.)), and Doctor of Juridical Science (S.J.D.)

SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil Engineering) (B.S. (C.E.)), Bachelor of Science (Electrical Engineering) (B.S. (E.E.)), Bachelor of Science (Mechanical Engineering) (B.S. (M.E.)), Master of Engineering Administration (M.E.A.), Master of Science (M.S.), and Doctor of Science (D.Sc.)

SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed.) Bachelor of Science in Physical Education (B.S. in P.E.), Master of Arts in Education (M.A. in Ed.), Master of Arts in Teaching (M.A.T.), Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Business Administration (B.B.A.), Bachelor of Science in Administration (B.S. in Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.), Master of Arts in Government (M.A. in Govt.), Master of Arts in Health Care Administration (M.A. in H.C.A.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), Master of Science in Administration (M.S. in Adm.), Master of Urban and Regional Planning (M. of Urb. and Reg.Plan.), Post-Master's Graduate Certificate in Health Care Administration (Grad.Cert. in H.C.A.), Doctor of Business Administration (D.B.A.), and Doctor of Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.), Master of Arts (M.A.), and Master of Science in International Affairs (M.S. in I.A.)

THE GEORGE WASHINGTON UNIVERSITY

COLUMBIAN COLLEGE OF ARTS AND SCIENCES, 1821

THE GRADUATE SCHOOL OF ARTS AND SCIENCES, 1893

THE SCHOOL OF MEDICINE, 1825

THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, 1928

THE COLLEGE OF GENERAL STUDIES, 1950

THE DIVISION OF UNIVERSITY STUDENTS, 1930

THE SUMMER SESSIONS, 1916

THE UNIVERSITY HOSPITAL, 1898